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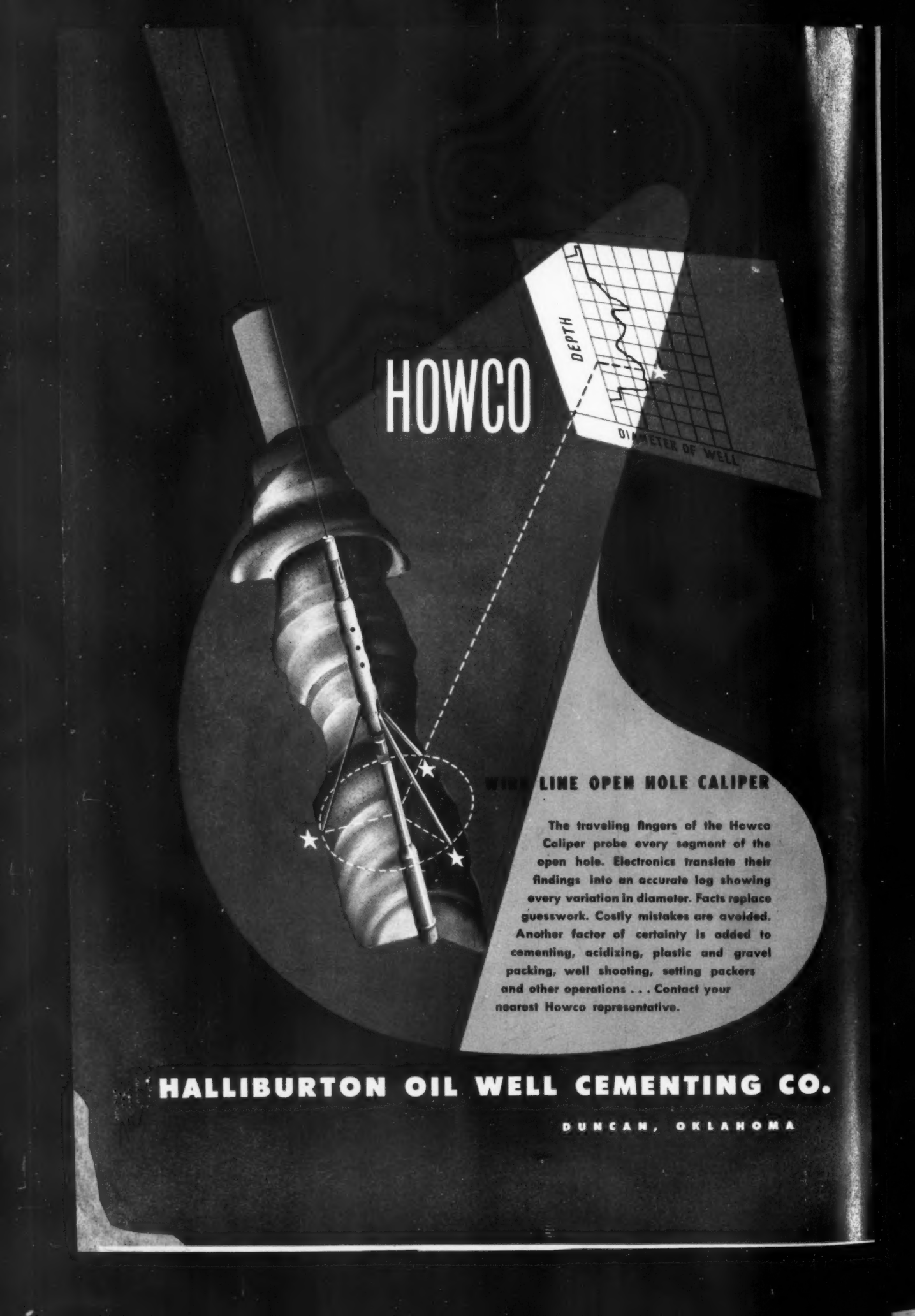

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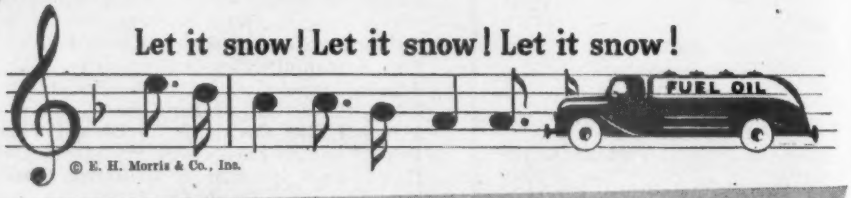

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1948

JOURNAL editors in all parts of the oil country are now engaged in compiling the final data covering 1947 oil activities. With the aid of information supplied by hundreds of operators representing all divisions of the industry, they are at the same time preparing the projections for the year just started which will be featured in our Annual Number of January 29.

While the detailed analyses are invaluable as a guide in collective and individual operations of the oil industry, the general outline of what is to come in 1948, oilwise, has been well defined for several weeks. Of controlling importance is the fact that the domestic and foreign demands for all the principal products will be substantially greater than during the record-breaking year just closed.

A crisis which has been in the making for 2 years threatens shortages in the winter supplies of the various grades of oil fuel in this and other countries. To enlarge the output of intermediate and residual products refiners have resorted to the reduction of gasoline yields, a practice which violates a long-accepted conservation policy of expanding the output of the most essential products obtained from a barrel of crude oil.

The world petroleum industry has the required crude-oil proven reserves and it will do the best possible job in making this raw material available as finished products to the expanding economies of this hemisphere and to the peoples of the Eastern Hemisphere where recovery from war devastation is largely dependent on petroleum supplies.

These demands make mandatory maximum operations in practically every phase of petroleum activities. There is justification for more and more exploration in sections remote from existing production. More important, so far as immediate supplies are concerned, is the encouragement of wildcat operations within the known favorable oil areas. Furthermore, the additional crude required for this year cannot be supplied in this country without a corresponding increase in development drilling which for several years has not kept pace with enlarged output.

While projects recently completed or under way will bring substantial increases in transportation capacity, further expansion on land and sea is necessary to connect fields with refineries and to provide for enlarged distribution facilities. Growth in refinery output since the close of the war has been brought about largely by devising means to operate existing equipment in excess of rated capacity. Refining as well as transportation can become a petroleum bottleneck unless new plants are built where needed and existing plants enlarged.

Thus the petroleum industry enters a new year without a worry as to an adequate demand for its products. Its main concern is the securance of equipment and materials with which to expand its many-headed operations, upon which a world economy is dependent as never before.

HAPPY NEW YEAR

Current Statistical Data Point to Critical Fuel-Oil Situation

by John C. Casper and Henry D. Ralph

THE tremendous and unprecedented decline in stocks of distillate fuel oils during recent weeks presents the petroleum industry with a statistically insoluble problem and dramatizes the condition which is causing concern to the entire refining industry, thousands of oil-fuel distributors, and their customers.

Withdrawals of heating oils and other middle distillates from storage of refiners and large distributors during December has been at a rate which threatens to exhaust the stocks long before the end of the heating season.

Furthermore, this stock decline, if truly indicative of actual consumption during the current heating season, cannot be compensated by any increases or adjustments in refinery operations which would appear to be possible on the basis of the refining industry's history and statistical position.

To put it bluntly, a look at the fuel-oil figures indicates that there is no way in which the current rate of consumption can be maintained the remainder of the winter.

This situation is caused by an abnormal and excessive increase in demand for oil fuel, upsetting all calculations of suppliers. During the first 9 months of 1947, according to figures of the U. S. Bureau of Mines, consumption of all middle distillates was 16 per cent greater than during the same part of 1946, and 63 per cent above the first three quarters of 1941.

Of course there may be compensating factors. Some of the recent withdrawals may be going into storage for future consumption by shortage-conscious purchasers. The rest of the winter may be mild. Refiners may find ways to increase production far beyond any previous rate. Additional imports might be obtained from some source. But the present statistics are alarming.

Kerosine Stocks Decrease

During the first 3 weeks of December, stocks of kerosine decreased at the average rate of 179,000 bbl. per day, and stocks of distillate fuels declined 499,000 bbl. per day, according to figures of the American Petroleum Institute.

This is a drop of 678,000 bbl. per day in the stocks of all middle distillates, including furnace oil, range oil, gas oil, and diesel fuel, held by producers and principal distributors. The figures take no account of oil in consumers' tanks nor the working stocks of the smaller local retailers.

This means that consumers are using 678,000 bbl. per day more than is being produced. Figures for the final week of the month are not yet available, but if they show the same rate of stock declines as during the first 3 weeks, total stocks in the United States at the end of 1947 would be approximately 15,000,000 bbl. of kerosine and 47,000,000 bbl. of other heating oils, or total middle distillate stocks of 62,000,000 bbl.

One year ago, on December 31, 1946, the stocks were 17,081,000 bbl. of kerosine and 59,620,000 bbl. of other fuel oils, or a total of 76,701,000 bbl. Thus stocks today are nearly 15,000,000 bbl. less than they were this time last year.

Oil-fuel users thus are confronted with a low level of supplies, an increased rate of consumption, and the bulk of the winter still ahead.

January and February traditionally are the months of heaviest declines in fuel-oil stocks. For example, last winter in January 1947, kerosine stocks fell at the rate of 85,000 bbl. per day and other fuel oils at the rate of 369,000 bbl. per day, a total of 454,000 bbl. per day. The following month the daily rate was 105,000 bbl. of kerosine and 403,000 bbl. of other fuel oils, or a total of 508,000 bbl. on the average.

Sharpest Declines

These were the sharpest stock declines recorded until this winter. Contrast these figures with the December 1947 withdrawals of 179,000 bbl. per day of kerosine and 499,000 bbl. of all other fuel oils, or a total of 678,000 bbl. per day of all middle distillates.

While 1948 opens with total stocks of all fuel oils around 76,701,000 bbl., only about half this total will be available to consumers. The other half constitutes minimum working stocks—pipe-line fills; fuel oil in transit by water and tank car, being processed in refineries, and being moved through tanks of terminals and distributors. Industry economists figure that by the end of the heating season—March 31—the absolute minimum stock level must be approximately 8,000,000 bbl. of kerosine and 29,000,000 bbl. of distillate, or a total of 37,000,000 bbl. Even this quantity is so low as to threaten serious local distribution troubles.

With this in mind it is evident that fuel-oil stocks simply cannot decline during the rest of the winter at the rate they dropped during the first 3 weeks of December. If continued at that rate for the 71 days between December 20 and February 29, kerosine stocks would be down to about 4,000,000 bbl. and other distillate fuel oils down to around 16,000,000 bbl. by the first of March—figures which are only half what is considered to be the absolute working minimum by the end of March.

The possibilities for offsetting this stock drainage by increased production appear no brighter from a statistical viewpoint.

Heating-Oils Forecast

Leaving kerosine out of consideration for a moment, the total demand during the first 3 months of 1948 for other heating oils and distillate fuels is forecast at 1,275,000 bbl. per day by the economics committee of the Interstate Oil Compact Commission. If, during this period, stocks are not drawn down below the minimum working level, only 198,000 bbl. per day, on the average, can be taken out of supplies already on hand. It is probable that another 20,000 bbl. per day can be obtained from imports and by using crude oil directly for some fuel-oil purposes without refining.

This means that the nation's refineries will have to produce 1,057,000 bbl. of middle distillates (exclusive of kerosine) daily during the next 90 days. The compact committee forecast that during this period total runs of crude to refineries would average 5,300,000 bbl. daily—the highest which almost anyone in the industry believes can be attained. On this basis refiners would have to turn 19.9 per cent—one-fifth—of their crude into distillates if they are going to meet the indicated demand for fuel oils.

This is a higher rate than has ever been achieved, and higher than refinery economists believe can be achieved. During recent weeks the yield of distillates has been between

17.7 and 17.8 per cent of crude run, which is just a shade higher than the fuel-oil yields during the first quarter of 1946 when the fuel-oil situation was critical but not so critical as it appears to be today. During the first quarter of 1947 the refinery yields of distillates ranged between 16.1 and 16.9 per cent of crude run.

The kerosine situation, statistically, is not quite so bad. The demand forecast for the first quarter of 1948 is 415,000 bbl. per day, of which 77,000 can be taken from stocks without getting below the minimum working level. This leaves 338,000 bbl. daily to be produced, and on refinery runs of 5,300,000 bbl. of crude daily this would mean a yield of 6.4 per cent. During recent weeks the average kerosine yield has ranged around this figure, and yields as high as 7 per cent of kerosine have been attained during some months in the past.

However, one way for a refinery to make more fuel oil is to make less kerosine, and the kerosine situation is not sufficiently comfortable to permit much shifting of this sort. Another way is to make less gasoline and less residual, or industrial, fuel oil, but these products are not abundant at present. Moreover, there are physical and technical limitations on the extent to which the distillate yield of a barrel of crude can be increased.

It may be that the nation's total refining capacity can be increased somewhat beyond the 5,300,000 bbl. per day forecast—if more crude can be obtained and means found to transport it to the refineries. It may be that the recent stock-withdrawal rate is not a true measure of fuel-oil consumption for the winter as a whole.

But the current statistics certainly indicate that there will not be enough fuel oil to go around.

Oil Allocation Plan Asked as New Law Goes Into Effect

by Bertram F. Linz

WASHINGTON. — Voluntary programs for allocation of petroleum and steel among customers may be drafted for presentation to the affected industries very shortly under the authority of the new Taft resolution signed — with a protest — by President Truman this week.

Preparatory work for allocation of oil and steel, as well as some other commodities, was well advanced before the measure became law, but obstacles to early approval already were appearing.

Independent oil producers, for example, raised the point that the program might be tantamount to government allocation of steel which, they feared, would not give them as large quantities as might be obtained otherwise. They also questioned proposals for allocating oil, citing suggestions that heavy stock withdrawals might be going into a "gray market" and that the military may be stockpiling excessive supplies.

Anticipating by several days President Truman's action in signing legislation permitting voluntary agreements by industry to cope with material shortages, Director Max W. Ball of the Oil and Gas Division last week requested the National Petroleum Council to set up a committee to prepare recommendations for such a program for the oil industry.

Ball sent his request by telegraph December 24 to NPC Chairman Walter S. Hallanan, who immediately referred the matter to the agenda committee with a request for prompt action.

Ball based his telegram on the "probability" the President would sign the Taft resolution and that Secretary J. A. Krug would thereupon ask the council "to recommend such voluntary agreements or plans of voluntary action for allocation of petroleum transportation facilities and equipment and for priority allocation and inventory control of petroleum and petroleum products as it considers necessary, practicable and effective."

Other Developments

Other developments, among them the call of the Commerce Department for a conference with steel producers to develop an agreement for that industry and intimations that the OGD would have to set up as a "claimant agency" to see that steel was provided for the oil industry, created considerable uncertainty in independent oil circles, where the possibilities of a broad measure of control over the petroleum industry were seen as possible.

As viewed by the independents, the administration was attempting to secure by indirection the allocation power which Congress so far has denied the President.

It was pointed out the Commerce Department easily could make federal allocation of steel, for instance, the price of administration approval of an agreement for that industry. This, in turn, would make it possible for the Interior Department to set up the OGD as claimant agency for the oil industry, and to all practical purposes the Government then would have the same allocation control as it exercised during the war.

The independents concede that the facts of the situation make it necessary that some agency act as coordinator to see that available supplies are properly allocated and used. But they want that task handled by the industry itself, through a committee, and not by a government agency.

This is only one of several points the independents want clarified before the oil industry gets involved in any agreement. Another is whether a gray market is developing in oil, as indicated by recent withdrawals from stocks which are said to be greatly in excess of consumer demand. Still another is the charge the Army and Navy are stockpiling oil and concealing that fact by leaving it in commercial storage until needed.

This charge appears to be based in part on reports that when stocks of oil held for the military at some points were found to be in excess of previously set requirements, the requirements were increased to be greater than the stocks on hand.

NPC Studying Angles

A number of NPC members are now studying these angles, and when the matter of an industry agreement comes up at the next council meeting a stormy session may follow any resolution that does not provide for free and untrammeled action, without government interference or direction.

President Truman signed the Taft resolution with a tongue-lashing of Congress for its failure to give him the 10-point antiinflation program he demanded November 17.

In the 6 weeks since he asked price-control and rationing authority, the President said, prices have continued to rise, gasoline in Los Angeles increasing from 21.5 to 23.3 cents per gallon, among other items.

Truman devoted much of his blast to those sections of the resolution providing for the agreements and, where they fail to develop an adequate supply of vital raw materials, the development of recommendations for conservation which can be passed upon by Congress.

He pointed out that the provision for agreements gives the Government no authority to enforce their adoption by industries or by individual industrial units. Thus, he said, if members of an industry refuse to make an agreement, if the agreement they make is inadequate, or if some members of an industry refuse to participate, "there is nothing the Government can do."

However, in the enactment of the legislation, this very safeguard against use of agreements by the administration to secure allocation or other controls was a major objective of the Republicans in Congress. They had another objective, too, of

which the President complained as follows:

"It has long been an established practice for the Congress to enact regulatory measures in general terms, leaving it to the administrative agencies to determine when the measures should be applied on the basis of the standards and conditions established by the Congress. . . . This bill now proposes substantially to reverse this historic process."

The agreement and conservation provisions, the President said, are of "doubtful value" at best, and he signed the resolution because of the "meager authority" it provides for extension of export controls, allocation authority over transportation, and conservation power over grain.

War Committee Revived to Draft Steel-Industry Allocation Plan

WASHINGTON.—Immediate development of a voluntary allocation plan for the steel industry is planned by Secretary of Commerce W. Averell Harriman, who has called to meet in Washington January 8 the old steel-industry advisory committee of War Production Board which has been revived to work with the department on this matter.

Any program worked out will feature the withdrawal of supplies from nonessential consumers to provide more for the oil, railroad, machinery and other industries upon which the economy of the country is dependent.

One of the questions to be explored in connection with any such arrangement is the possible effect on long-term contracts. It is understood that the steel industry operates principally on short-term agreements and that such long-term contracts as may be outstanding contain escape clauses, so that this problem may be of less importance in steel than in some other commodities for which the Commerce Department also plans voluntary programs.

Nothing in the Taft Act provides relief for producers against breaches of contract if they cut off supplies from the customer. This may have to be reckoned with in any of the agreements made by the industry under the auspices of the Commerce Department.

Since there is no thought in the oil industry of cutting off customers and, in fact, the whole effort is to see that all get their fair share of the available supply, it is not believed the question of contracts will plague the petroleum industry coordinating committee.

Both producers and consumers of steel will be given an opportunity to express their views on the Commerce Department's suggestions for allocation which, it was said, will be purely suggestions, for acceptance or rejection by the industry. Department officials emphasized that the industry itself will have to make up the program, and their activities will be limited to counseling and, if necessary, seeking to expedite the planning.

In the course of the discussions, emphasis will be placed upon the supplying of additional steel for the oil industry. The many congressional studies of the past few weeks have convinced everyone, in and out of Government, that the present fuel-oil situation is the product of long years of steel shortage, and that permanent relief can be secured only by providing the materials necessary to increase oil supplies.

A number of industries already have been scheduled by the Commerce Department for voluntary agreements, and the steel meetings will be followed by conferences on aluminum, nitrogen, building materials, electrical machinery, and other commodities.

Texas Reasserts Claim To Gulf Lands

AUSTIN.—The state of Texas reasserted its claim to submerged Gulf of Mexico lands December 29 in a formal proclamation extending the state's boundaries to the edge of the Continental Shelf.

Texas heretofore has placed its boundaries out some 31½ miles in the gulf. The new proclamation issued by Bascom Giles, commissioner of the general land office, in accordance with a bill passed by the Texas Legislature last year, offically annexes by state action a total of 18,349,574 acres.

The status of all offshore lands is expected to be determined in the coming session of Congress, and the Texas proclamation anticipates favorable action in this respect. Paramount rights in the so-called marginal sea were vested in the United States under the Supreme Court's "Tidelands" decision.

The lands affected by the Texas proclamation were included in the area placed under the jurisdiction and control of the United States by executive order of President Truman September 28, 1945. The President at that time specified that his action left open for legislative or judicial determination the state-federal ownership issue.

Texas' boundaries were at 10½ miles, under the agreement by which it entered the Union. These were extended to about 31½ miles by action of the legislature about 10 years ago.

Giles said land office engineers have been at work the last several weeks mapping and surveying the area included in the proclamation. He pointed out the distance to the edge of the Continental Shelf varies considerably, being about 51 miles near the Texas-Mexico boundary and about 130 miles off the coast of Jefferson County at the Louisiana line.

Giles said the work had been completed quickly so that the 12 coastal counties would have the information necessary to place the area on the 1948 tax rolls. Oil and gas leases in the affected area are taxable, even though not producing.

Oil Exports Due for Congressional Probe

WASHINGTON.—The Senate small business oil subcommittee will lead the New Year parade of congressional investigations with a hearing January 5 on oil exports.

Chairman Kenneth S. Wherry of Nebraska has called representatives of the Department of Commerce, Army-Navy Petroleum Board, State Department, and other agencies to testify on the volume of oil now being exported, the operation of export control, and other factors, and also plans to go into the question of "leakage" of oil from this country, how much military oil is being used for aid programs, and the stockpiling of oil by the military.

The House interstate commerce committee has not worked out its program, but is expected to resume hearings in the near future. It will run into competition January 19 when the House armed services committee opens an inquiry into the military oil situation.

The armed services investigation will go into questions of over-all supply as well as military requirements. Members of the staff have been conferring with oil men to get leads for inquiry into such matters as allegations of stockpiling, and had a tentative list of nearly 200 witnesses, which, however, is expected to be cut to a fraction of that number.

Chicago Storage Plant Begins Operations

New oil storage facilities capable of handling a capacity of 250,000 bbl. has recently been placed in operation on the Sanitary Ship Canal at Chicago, by Marine Oil Terminal Co. a subsidiary of Consumers Petroleum Co.

this week

TRENDS—United States crude-oil production averages 5,310,820 bbl. daily during week ended December 27. . . . Increases 10,865 bbl. over previous week. . . . Falls short of all-time high of 5,318,415 bbl. by only 7,595 bbl. . . . ¶For the second consecutive week Kansas records the largest gain of the states with an increase of 4,900 bbl. daily. . . . Oklahoma shows greatest decline . . . ¶Well completions totaled 657 for the week ended December 27. . . . Drops 12 from previous week's total. . . . Wildcat completions for the week totaled 7. . . . For previous week, 17. . . . ¶Refinery runs to stills for the week ended December 20 average 5,246,000 bbl. daily. . . . Increasing 142,000 bbl. daily over previous week. . . .

REFINING—Completion of the asphalt-processing plant near Perth Amboy is scheduled for May 15. . . . Plant is to process a minimum of 50,000 tons of asphalt per year. . . . ¶Consumption of synthetic rubber in the United States for 1947 drops 207,699 tons from preceding year. . . . ¶Southern Pacific Railroad lines announce purchase of additional 20 diesel-electric freight locomotives and 20 diesel-electric switch engines. . . . Cost about $12,000,000. . . .

GOVERNMENT—Oil industry asked to establish voluntary allocation program under new antiinflation law. . . . NPC considering the proposal. . . . Many obstacles loom. . . . ¶Wartime committee revived to allocate steel. . . . Oil men fear opening for government controls. . . . ¶Returning Congress faced with demand for more price and distribution controls. . . . Also details of European relief plan. . . .

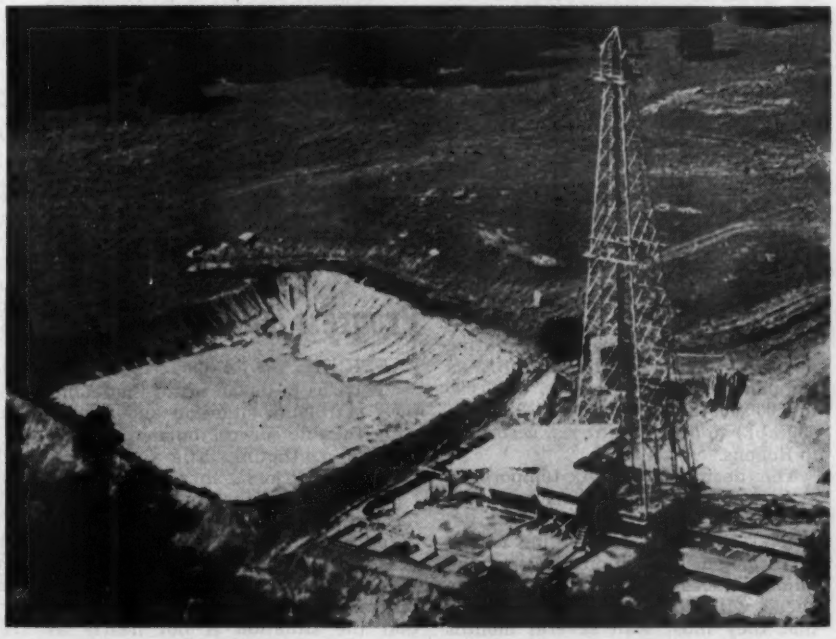
GAS—Natural-gas sales up 14 per cent in 1947, year-end review shows. . . . Customers, revenues, of gas utilities increase sharply. . . . ¶L.P.G. sales gain 30 per cent in year. . . . More than doubled in past 3 years. . . . But expanding uses keep ahead of industry's capacity. . . .

PIPE LINE—Stanolind Pipe Line Co. has purchased South Plains Pipe Line Co. . . . Company has line connections to wells with 9,000-bbl. daily production in Slaughter and Levelland fields. . . . Stanolind is preparing for 1948 main-line looping and extension projects of more than 500 miles. . . . ¶Deliveries of motor fuel from pipe lines during first 9 months of 1947 total 180,831,000 bbl. . . . Increasing 12.2 per cent over same period of the preceding year. . . . ¶Campbell, Wyant & Cannon Co. completes the 30-mile Kimball Lake-Muskegon 6-in. natural-gas line. . . . ¶Pipe laying is scheduled to begin this week on the Las Mercedes-Pamatacual 135-mile 16-in. crude-oil pipe line in eastern Venezuela. . . . ¶Rio Grande Valley Gas Co. completes laying of 43 1/2-mile 10-in. San Salvador-Harlingen-San Benito, Tex., line. . . .

FUEL OIL—Stocks of oil fuels dropping at alarming rate, statistical analysis shows. . . . Threaten to fall below minimum working level in few weeks. . . . Refinery runs must yield 20 per cent middle distillates to meet demand. . . .

CRUDE PRICES—California purchasers raise prices 50 cents per barrel. . . . Increase, started month ago, has now spread throughout nation. . . . Effect shown in new field price tables. . . .

INTERNATIONAL—England slows oil-conversion program. . . . Plans expanded refining capacity. . . . ¶Russians claim progress in oil program. . . . ¶Colombian wildcatters discouraged. . . . ¶Creole's large Venezuelan refinery going up rapidly. . . .



The well of the week is Stanolind Oil & Gas Co. 1 Briscoe in Grady County, Oklahoma, which may prove to be the world's deepest producer. A drill-stem test flowed from a section reaching to 14,238 ft., but the actual producing level had not been ascertained. *See story on page 106*

International

WORLD-WIDE OIL DEVELOPMENTS

Oil-Conversion Program Is Slowed in Great Britain

ALTHOUGH Great Britain has a £95,000,000 ($380,000,000) refinery-expansion program envisioned for the years immediately ahead, all commercial firms planning to convert from solid to liquid fuels have been asked to inform the regional representative of the Petroleum Board as to the stage reached in obtaining the necessary equipment.

In short, Great Britain is concerned about the additional amount of fuel oil which must be imported, particularly during the 2½ years immediately ahead. Firms which have been authorized to convert and which have not yet begun to do so are being advised not to proceed until further notice.

Oil consumption in the United Kingdom has increased from 11,000,000 tons (225,000 bbl. daily) in 1938, to an estimated 16,000,000 tons (330,000 bbl. daily) in 1947. In 1946, the United Kingdom consumed 13,000,000 tons (267,000 bbl. daily).

Alfred Robens, United Kingdom parliamentary secretary to the Ministry of Fuel and Power, stated at a recent press conference in London that during 1948 9,400,000 tons (70,500,000 bbl.) of gasoline will be needed for the sterling area and that 3,500,000 tons (26,200,000 bbl.) will be purchased from American oil companies marketing in the sterling area. The remaining 5,900,000 tons (44,250,000 bbl.) reportedly will be supplied by British oil companies operating in the sterling area. The same British companies also will export 2,500,000 to 3,000,000 tons (18,750,000 to 22,500,000 bbl.) to other countries, according to Robens.

The decision to halt, temporarily at least, additional conversions in the United Kingdom, "is not a panic decision," Robens stated, adding that it is rather a precaution because the ministry does not want firms to go ahead with conversions only to find that they must wait several months for oil supplies. And if the demand in the United States, and elsewhere in the Western Hemisphere, continues to increase at the same postwar rate evidenced so far there might well be difficulties ahead in meeting demand elsewhere, Robens explained.

Main problem is tanker transportation, the parliamentary secretary told newsmen. Before the war, the United Kingdom had 28 per cent of the world's total tanker tonnage but today's fleet represents less than 20 per cent. On the other hand, he stated, tanker tonnage in the United States is slightly more than 50 per cent of the world total, compared with 26 per cent before the war. Fifty tankers have been purchased by British companies from the U. S. Maritime Commission, Robens said.

(The Maritime Commission's latest report states that all of its remaining tankers have been sold, of which 83 went to foreign buyers and 54 for United States flag operation.)

Meanwhile, reports state that a large number of tankers are currently under construction in British shipyards and that tanker repairs have been given a high priority in the United Kingdom.

Soviet Reports Claim Progress on Oil Program

OFFICIAL Soviet Government reports as to the status of that country's petroleum situation and reports from reliable sources outside of Russia are conflicting. The Communist newspaper Pravda, in a late December issue, stated that "great progress" has been made this past year, compared with 1946, but as usual no figures were released—only percentages.

Dispatches from United States intelligence officials abroad indicate that the situation is not nearly as good as the Reds claim and that, in fact, Soviet industry is suffering somewhat from lack of petroleum products. Inefficient production methods account for part of the current shortage, plus the fact that Russia, like all other countries, is unable to obtain all the steel equipment needed to expand operations.

In a letter, which Pravda states is from Russia's oil-field workers, the workers reportedly have pledged to fulfill the 5-year oil goal in 4 years. Percentage increases in 1947, compared with 1946, were given as follows:

Sixteen per cent higher in the first 11 months of 1947 for the Baku, Grozny, and Maikop areas, as well as other fields in the south and west. Refinery throughput, 25 per cent higher for the same areas. Crude-oil output for the so-called Eastern area, 25 per cent higher; gasoline refined, 37 per cent higher.

Goal of the latest 5-year plan was to reach prewar production by 1949 and to exceed it in 1950 when the Russians hoped to reach an annual output of 35,400,000 tons, or approximately 727,000 bbl. daily.

(For a discussion on Russia's probable crude-oil reserves, see The Oil and Gas Journal, December 20, 1947, page 44.)

Colombian Concessions Dropped as Tests Fail

Oil exploration in Colombia has been generally unsuccessful in many regions and a number of companies are considering returning their concessions to the government as a result of heavy losses in wildcatting operations, according to reports in the Colombian press.

Partially offsetting this unfavorable news was the report that Texas Petroleum Co. had brought in a new producing well in Teran-Guaguaqui, 3 Velasquez, total depth 7,668 ft., which on a 24-hour production test yielded 510 bbl. per day of 22.3° to 23.8° A.P.I. gravity oil with a gas-oil ratio of 1,057, on a ¼-in. choke. The well was spudded on August 28 and completed as a producer December 13, or 108 days of operations.

Sinu Oil Co. (Socony-Tropical) has returned to the government two con-

cessions, La Risa and Floresanto, in the Department of Bolivar. Texas Petroleum Co. has stated that it is considering the surrender of some of its concessions, and several months ago Tropical Oil Co. (International Petroleum Corp.) discontinued all tests in the Llanos area. Shell Co. of Colombia has drilled nine unsuccessful wells in the Voragine region of the Llanos area.

On the other hand, Cias. Unidas de Petroleo (Sinclair) spudded its first test at San Andres, Bolivar Department, on July 1, and great interest is being shown in a test planned by Richmond Petroleum Co. of Colombia in El Choco Department on the Pacific Coast, since oil discovered there would be easily accessible to the coast for export and to supply Western Colombia. Richmond's drilling operations in Atlantico, Magdalena Valley, and Tolima have been unsuccessful.

Haifa Refinery Scene of Bombing and Rioting

Approximately 50 Jewish and Arab employes and spectators were killed and a large number injured at the Haifa, Pelestine, refinery of Consolidated Refineries, Ltd., December 30 as a result of bombing and rioting. Considerable damage resulted at the refinery which has a crude-oil capacity of 63,000 bbl. daily. The Consolidated company is jointly owned by the Anglo Iranian Oil Co., Ltd., and the Shell interests and the refinery is the largest in the Mediterranean area. It receives most of its crude oil by pipe line from the Kirkuk field in Iraq.

United States Firm To Drill for Pemex

Marshall & Smith, drilling contractors headquartered at Artesia, N. M., have purhased a new semiportable drilling rig for contract work with Petroleos Mexicanos, Mexican government oil agency. The new drilling equipment will be engaged in deep core drilling exploration work for Pemex in the states of Vera Cruz and Tobasco. Active operations will be commenced shortly.

Welsh Refinery Plans To Increase Capacity

National Oil Refineries, Ltd., a subsidiary of Anglo-Iranian Oil Co., Ltd., has just announced that the capacity of its refinery at Llandarcy, near Swansea, South Wales, is expected to be increased to 1,000,000 tons yearly (20,500 bbl. daily) when present expansion plans are completed. The Llandarcy refinery has a throughput capacity of 11,000 bbl. daily at present.

In making this announcement in London, National Oil Refineries said that it is proposed to install the most modern type of equipment to process lubricating oils and waxes and to make heavy-grade lube oils and high-melting-point waxes. It is also planned to provide for a large increase in manufacturing facilities for liquefied petroleum gas. Heavy fuel oil will also be refined in greater quantities.

Capital expenditures are expected to exceed £9,000,000 ($36,000,000) and will mean that the greater percentage of Great Britain's petroleum-product consumption will be refined domestically. The company aims at better quality products as well as increased quantity. The bulk of the United Kingdom's lubricating oil now comes from the United States and elsewhere in the Western Hemisphere.

High Creole Output Below Record Level

CREOLE PETROLEUM CORP.'s November production from its Venezuela oil fields averaged 603,814 bbl. daily, compared with the all-time high in October of 604,127 bbl. daily. Refinery runs in November dropped to 64,852 bbl. daily compared with 70,063 bbl. for October.

November's output showed that 440,579 bbl. daily came from the Lake Maracaibo area; 9,557 bbl. daily from Mara district and Cumarebo; and 163,678 bbl. daily from Eastern Venezuela.

Nineteen development wells were brought in, all oil producers, and four exploratory wells were completed, three of them oil producers and one a gas well. In the West Lake field, Creole drilled an exploratory well for Shell, VL-1, completed November 8. The fields where the producers were brought in, their average initial production and average depth follow:

Development wells: Bolivar Coastal (B.C.F.), eight, 1,029 bbl., 5,365 ft.; Quiriquire, six, 690 bbl., 4,146 ft.; Jusepin, two, 280 bbl., 4,378 ft.; Mulata, one, 175 bbl., 5,156 ft.; San Joaquin, one, 475 bbl., 7,126 ft.; and Temblador, one, 190 bbl., 3,954 ft.

Exploratory wells: Jusepin area, two, 129 bbl., 5,690 ft.; Roble, one, 392 bbl., 6,105 ft.; and Mulata, one, 290 bbl., 5,228 ft. In Mulata field, one gas well was brought in but no details are now available.

Of the 64,852 bbl., which Creole refined daily, 62,329 bbl. were at the Caripito refinery and the remaining 2,523 at La Salina.

Tanker Scheduled From East

The fourth tanker to deliver crude oil from the Middle East to the Socony-Vacuum Oil Co., Inc., refinery at Paulsboro, N. J., is scheduled to arrive January 18. The tanker, the French Creek, will carry 15,000 tons of crude oil loaded from Ras Tanura.

COUNCIL SCHEDULES I.S.A.P. CONGRESS IN MARCH

The first inter-American congress of the South American Petroleum Institute will be held in Lima, Peru, sometime in March, it was decided by members of the I.S.A.P. council, shown above, at their recent meeting in Montevideo, Uruguay. March was selected, council members said, in order to avoid a conflict with the International Petroleum Exposition, to be held in Tulsa May 15-22. Delegates to the council conference are, seated, left to right, Salvador Masson, member of the I.S.A.P. executive committee; Mario L. Villa, president of the Argentina section; Carlos Vegh Garzon, I.S.A.P. president; Dr. Juan M. Velasco, director of Peru's Mining and Petroleum Bureau; and Emilio Viana, Bolivian section representative. Standing, left to right, are E. Perez Prins, director of refining for A.N.C.A.P., Montevideo; Jaime A. Botet, Uruguayan delegate; Dr. Carlos E. Velarde, Argentina delegate; T. Larre Borges, vice president of the Uruguayan section; Roberto L. Valverde, president of the Peruvian section; Dr. Reynaldo Deambrosis, Uruguayan delegate; Alfredo D. Levero, Uruguayan delegate; and German E. Villar, general secretary of I.S.A.P. Not pictured here is Fabio Leal, Brazilian section representative

Polish Oil Industry—

TODAY'S *Position*

TOMORROW'S *Prospects*

The author of this survey is one of the most experienced European petroleum technologists. He has been active as chief chemist with Polish oil refineries and research institutes for over 25 years, and has personally experienced all the eventful war years in Polish industrial life under enemy rule.

by Hugo Burstin

International
WORLD-WIDE OIL DEVELOPMENTS

Historical Background

IN no other allied country did the oil industry experience such radical changes as a result of World War II as in Poland. One of the implications of the Yalta agreement was that Poland's eastern frontier was moved west, roughly from 27° to 23° longitude. This adoption of the much-disputed Curzon line gave to the Soviet Union the world-famous and ancient East Galician oil fields, notably those of Boryslaw with a number of large and modern oil refineries at Drohobycz. The areas lost were responsible for 75 per cent of Poland's total postwar production. The country's output was reduced from approximately 500,000 metric tons (3.7 million barrels) to about 125,000 metric tons (920,000 bbl.) per annum.

Prior to the war, Poland produced oil much in excess of her home requirements and exported about 40 per cent of her petroleum products. Today twice the quantity of home-produced oil must be imported from abroad. The serious position which arises from such drastic reduction of available crude oil is further aggravated by the increased demand for all types of mineral oil, following the acquisition by Poland of highly industrial areas in the west. There is not at present even enough home-produced crude to maintain full employment of such petroleum refineries as remained on Polish territory. The adjustment of Poland's western frontier from about 18° to 15° longitude constitutes no compensation for oil losses in the east of the country as there is no oil production in the newly acquired areas.

Ownership and Organization

Prior to the war, the Polish oil industry was comprised of privately owned concerns, mostly in American and French hands. Today the entire heavy industry of Poland, and with it the oil industry, is nationalized and the previous owners are to be compensated as soon as Poland can provide the necessary foreign currency, according to a statement issued by the Polish Minister for Industry, H. Minz.

The internal organization of the Polish oil industry has been changed several times since the end of war. At present, there is the Centralny Zarzad Przemyslu Paliw Plynnych (Central Board for the Industry of Liquid Fuels), known as the C.Z.P.P.P. This body administers all production and processing of oil and natural gas in the country as well as all prospecting activities. The production of synthetic gasoline from water gas was also within the scope of the C.Z.P.P.P., but this has quite recently become an independently organized industry. The C.Z.P.P.P. is at present being reorganized into Generalna Dyrekcja Panstwow. Przedsiebiorstwa "Nafta" (Directorate General of the State Company "Nafta") which is to be run on a commercial basis. The directorate general will comprise the following departments:

1. Oil prospecting (seat in Cracow).
2. Oil mining (seat in Jaslo).
3. Natural gas (seat in Tarnow).
4. Oil refining (seat in Cracow).
5. Machine and drilling equipment (seat in Glinik Mariampolski).
6. Distribution of oil products (seat in Warsaw and Cracow).

Import and export are included in the scope of Department 6. Two further bodies, the Polish Petroleum Institute which concerns itself with all scientific aspects of the industry, and the Central Bureau for the Supply of Materials, the function of which is self-explanatory, are responsible for their activities to the directorate general.

Polish Petroleum Institute

The Polish Petroleum Institute is a body which existed already before the war and had its seat in Krosno. It has been reestablished and considerably extended after the war, its function being to provide a scientific basis for all new ventures in industry and to solve all problems and difficulties encountered in practice. The institute consists of five departments, viz., chemical, drilling, mechanical, technical training and organization of labor, and editorial. The monthly publication Nafta is issued by the Polish Petroleum Institute on behalf of the central board for the industry of liquid fuels and much is done through this medium and other publications to further scientific and technical education in the country. The various technical schools which are organized and administered by the institute are based on the same principle. The institute is also in charge of two commissions which are concerned with (1) standardization of drilling tools, and (2) standardization of petroleum products.

The import figures for 1947 cannot at this stage be given as final, but

TABLE I—IMPORT OF CRUDE OIL AND PETROLEUM PRODUCTS

Source of supply—	Petroleum products	July 1947 m. tons	July 1947 Bbl.	August 1947 m. tons	August 1947 Bbl.
U.S.S.R.	Fuels and lubricants	17,280	121,000	3,780	26,000
Russian zone of Germany	Synthetic gasoline	3,479	24,000	4,511	31,000
Hungary	Crude oil	259	1,800	798	5,570
Hungary	Fuels and lubricants	1,507	10,600	663	4,630
England	Lubricants	1,955	13,650	855	6,000
U.S.A.	Lubricants	.....	.....	976	6,830
		Million cu. ft.		Million cu. ft.	
U.S.S.R.	Natural gas	232		198	

Table 1 will give an insight into the present-day situation.

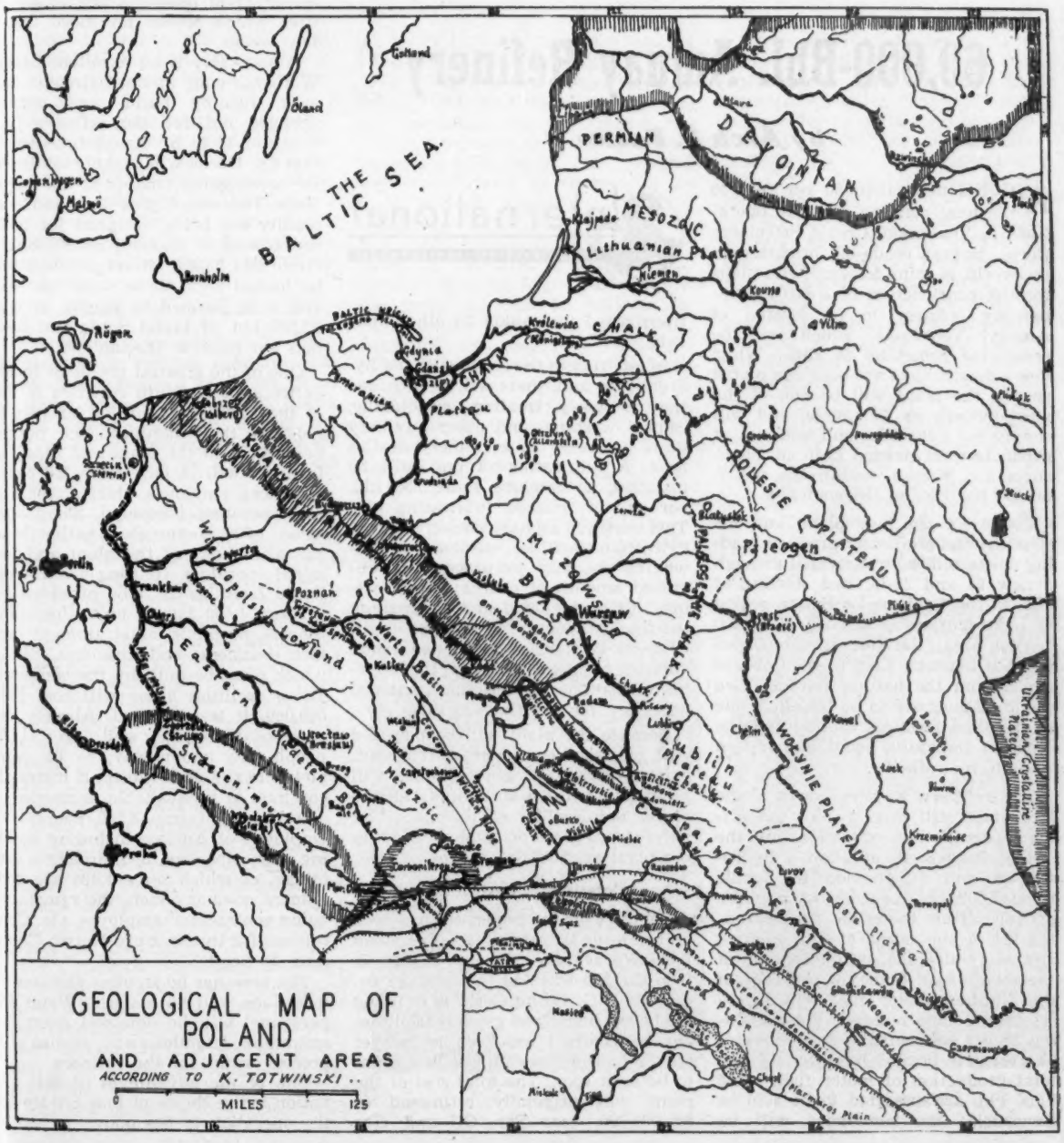
Transportation and Storage of Oil

Despite great efforts to increase the native production of oil, Poland will have to depend largely on imported crude oil and mineral oil products, at least for several years to come. In this connection, an efficient transportation system and particularly the full utilization of Poland's waterways is of the utmost importance. This cheap method of carrying industrial products to all parts of the country is destined to find even greater application in present-day Poland than before the war. Considerably greater facilities are offered by the extension of the Polish coast line from about 25 to nearly 300 km., as well as the inclusion within Polish boundaries of the arterial river Odra (Oder) and of several important Baltic seaports, like Szczecin (Stettin), Kolobrzeg (Kolberg), and Elblag (Elbing).

The great Baltic port of Gdansk (Danzig) which before the war was a free city, Poland having been granted certain rights by the Versailles treaty, now became exclusively Polish. It should be remembered that the river Vistula connects Gdansk with the oil fields in the Carpathian foothills and with the Polish capital, Warsaw. Szczecin lies at the mouth of the river Odra which thus provides an excellent link between the big industrial area of Silesia and the sea. Several important river ports lie on the Odra, such as Wroclaw (Breslau) and Kozle and the significance of this great waterway is thus greatly enhanced. The river Odra has its own considerable and efficient fleet of river craft.

As already mentioned, Poland produced before the war about 500,000 metric tons (roughly 3.7 million barrels) of crude oil per annum. We shall now concern ourselves with the output of the oil and gas fields which lie west of the Curzon line and therefore remained British. The figures in Table 2 refer to these areas only.

(Continued on page 119)



Construction scene of a portion of the huge new refinery installation of Creole, north of Lake Maracaibo. Shell also is building a very large refinery at nearby Punta Cordon

Creole Progressing With Building 60,000-Bbl. Amuay Refinery

by Arch L. Foster

ADDING more than 50 per cent to the total refining capacity operations in Venezuela, Creole Petroleum Corp., largest crude-oil producer in the world, is going forward with plans for the construction of a 60,000-bbl.-per-day refinery to be located at Amuay, Venezuela, which will be completed sometime in 1949. While many details have not been completed as yet, the plant will be one of the most modern in Venezuela, and will supply the quantities and qualities of products most needed both in Venezuela and abroad, within the distribution territory of the company.

Crude for the new plant, and the terminal and crude-and-products loading docks, will be transported through a new 24 and 26-in. line starting at Ule, in the Cabimas-La Salina region of Lake Maracaibo and traveling the coastal area; the line is submerged to pass beneath Colfete de Coro to Amuay, on the natural harbor. Two pump stations are to be installed, one at the field terminal at Ule, and the other at Dabajuro, about halfway en route to the refinery.

The refinery will include a single large pipe still to carry out the primary distillation operation on the crude charged. In addition a hydroformer unit is planned to handle some 7,000 bbl. per day of naphtha produced from the crude, for upgrading the octane rating of this product, and to reduce the sulfur content of the motor fuel. Some 75 per cent of the finished motor fuel will be 90 research octane number; the remaining 25 per cent will be Esso extra of 97 research octane number. Of the total production of motor fuel, some 5,000 bbl. are expected to be sold in Venezuela; the remainder will be transported via tanker to other markets.

International

In addition to the crude still and hydroformer unit, there will be provided the necessary treating, sweetening, caustic washing, and other auxiliary units necessary to a refinery of this type. A lubricating-oil unit will be installed, to produce some 200 bbl. per day of finished lubricating oils. This unit will include phenol solvent-extraction facilities, also solvent-dewaxing capacity to process the required amount of charge; clay treating will be included also to upgrade the final product. A vacuum still will be built to reduce the topped crude volume required to yield the overhead distillate or residual material necessary for the finished oils.

Because the plant will be powered with electrical equipment throughout, a large 22,500-kw. power house will be installed which will supply all the power required for all purposes. The only steam-powered pumps used in the plant are the fire pumps.

Details of Construction

Contract for the crude still has been let to Foster Wheeler Corp. Hammond Iron Works and Chicago Bridge & Iron Co. are erecting the tankage required. J. G. White Corp. is building the power house and general facilities, and no contract has been let as yet for the hydroformer unit or lube plant to be built soon. The total cost of the plant was originally estimated at $65,000,000, (*see The Oil and Gas Journal, July 20, 1946, page 66*), but no definite and final figures are available as yet. The increasing cost of construction prohibits any exact figures which obtain for more than a few weeks.

Amuay Bay is an excellent harbor. Work has gone forward already, dock area, turning basin, and channel dredged out for the refinery to a depth of 35 ft. by Gahagen Construction Co. Docks will include six berths for ocean-going tankers of the largest sizes. The entire pipe line and dock facility are being designed for quick turnaround of tankers; 240,000 bbl. of crude and 55,000 bbl. of products will be loaded from these docks per day, and it is planned to handle at least 20,000 bbl. of liquid crude and products per hour, to the tankers.

One of the greatest problems in this entire area of South America is that of the auxiliary facilities for personnel and their families. The permanent cadre of the plant and pipe-line facilities will include some 250 North American employes, chiefly technical and operating personnel, along with some 1,600 Venezuelan nationals as the main body of the plant and terminal operators. Housing and recreational facilities must be provided for at least 1,400 family units, including schools, hospitals, entertainment centers, business, and churches, all of which must be built by the company. These facilities alone will cost $30,000,000, it is estimated. Already accommodations for well over 1,000 people are under way, to be completed in the near future, if materials continue to be available as needed.

At present some 3,500 people are employed at Amuay, including building men, pipe-line men, dredgers, and others, of which some 1,400 are permanent company men, the remainder being contractors' employes, etc. Contractors for the dock are Merrit, Chapman & Scott.

The area has no tropical diseases or infections, and no malaria. Water for personnel will be obtained from the mountains, 70 miles away, as also will process water for the refinery.

One of the advantages of this situation is the choice of four crudes for the operation of the plant.

California Standard Raises Crude Prices; 50-Cent Advance General

LOS ANGELES.—Standard Oil Co. of California, leading crude purchaser on the Pacific Coast, has announced an increase of 50 cents per barrel in its prices for crude oil purchased in California, effective 7 a.m. on Saturday, December 27.

The increase was "across the board," and added 50 cents to the previous postings for crude of all gravities in all fields.

As a result of the higher crude prices, Standard also increased its prices for refined products as follows: Gasoline 1.8 cents per gallon, gas and diesel oil and light fuels 1.2 cents per gallon, and fuel oil 40 cents per barrel.

Standard's announcement said that after having maintained existing crude prices for the past month in the face of nation-wide increases now affecting 85 per cent of the nation's oil supplies the company found it necessary to adjust its prices to producers because of higher levels prevailing elsewhere.

New crude price postings in California, which became effective this week, and schedules for major fields in other parts of the United States which became effective during the first week of December, are shown in detail in tables on pages 107-109 of this issue.

Union Oil Co. of California and General Petroleum Corp. promptly met Standard's crude-price increase, but announced that they were still studying the proposed increase in products prices. Other companies which in the past have followed Standard's lead made no announcements immediately, but it was generally expected that they would also increase their prices by the same amount.

The crude-price situation in Californie became muddled on December 2, when Union announced an increase averaging 40 cents per barrel. At that time crude prices were being increased by 50 cents per barrel in various fields east of the Rocky Mountains, an increase which became general by December 6. However, no other California purchasers increased their posted prices until Standard acted, although in the interim several producers reported that they were demanding and getting prices above the posted schedules in various fields.

The new price schedules announced by Standard, if adopted by all California purchasers and refiners, should meet the recent complaint of the Oil Producers Agency of California that the differentials below prices prevailing in the rest of the United States would result in diversion of products away from the Pacific Coast and cause the closing of many smaller refineries.

Continental Gets Discovery In Montague County

PONCA CITY, Okla.—Continental Oil Co. has announced a new discovery in a joint-interest wildcat well in the Stoneburg Block, Montague County, North Texas.

The well is located 3 miles northwest of Bowie and is approximately 4 miles southwest of Hildreth pool, prolific conglomerate pool in which Continental is the major owner.

The well, 1 D. B. Benson, was drilled to a total depth of 6,468 ft. and first tests showed a daily production at the rate of 1,192 bbl. of 41°-gravity oil through ¾-in. choke.

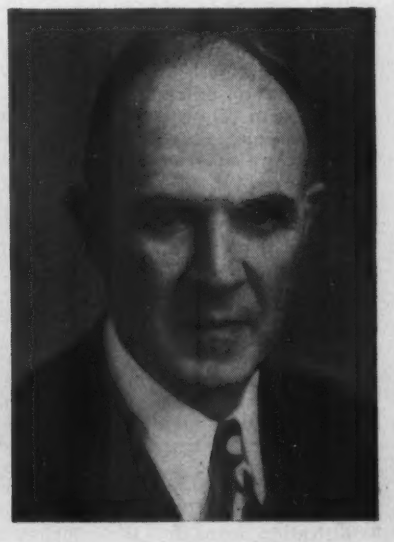
Two Stanolind Officials Promoted

A. L. SOLLIDAY has been elected executive vice president of Stanolind Oil & Gas Co., Tulsa, and J. E. Rouse, who had been manager of the manufacturing department, has been elected operating vice president to succeed Solliday. The changes were announced December 30 by E. F. Bullard, president.

Solliday, a native of Watertown, Wis., was employed as a scout by Dixie Oil Co. after receiving his degree in geology from University of Oklahoma in 1923. In 1925 he became district geologist, and when Stanolind was organized January 1, 1931, he was promoted to superintendent of the land department. In 1932 he became manager of the exploration department and held this position until 1944 when he was elected a director and vice president in charge of operations. Solliday is an active member of American Association of Petroleum Geologists, American Petroleum Institute, and Mid-Continent Oil and Gas Association.

Rouse received a degree in mechanical engineering from Brown University in 1913, and immediately went to work for Standard Oil Co. of New Jersey at the Bayonne, N. J., refinery. In 1918 he joined Midwest Refining Co. as a construction engineer, and when Midwest was purchased by Standard Oil Co. (Ind.) in 1921 he was promoted to assistant general superintendent of the Casper, Wyo., refinery. Ten years later he was placed in charge of all refineries in the Rocky Mountain division. Rouse became assistant general manager of manufacturing for Indiana Standard in 1933 and held this position until July 1943 when he was loaned to the Government, first for work with the Petroleum Administration for War and later with the Navy Department. He joined Stanolind in November 1945 as manager of the manufacturing department, and on January 1, 1947, was elected director in charge of manufacturing and producing operations.

A. L. SOLLIDAY



J. E. ROUSE

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Congress Back on Oil

WASHINGTON.—When Congress returns to Washington next week for the 1948 session it will find plenty to do oilwise, even aside from the shortage investigations, antiinflation campaign, and Marshall plan legislation.

Big issues which it may face in the near future are contained in the "tidelands legislation" and the measure to amend the Natural Gas Act.

It now appears likely that tidelands will be the subject of legislation from two different angles—one a move to return to California the offshore oil lands which the Supreme Court last June said belonged to the federal Government, the other a bill for administration of the lands as proposed by the Department of Justice.

Amendment of the Natural Gas Act already has passed the House, but was held up in Senate committee at the end of the regular 1947 session. An effort will be made to blast it out of committee, probably following the submission of the Federal Power Commission's report on its natural-gas investigation, several chapters of which already have been made public.

Also held over from the 1947 session is the Anglo-American petroleum agreement. This was the subject of lengthy hearings before the Senate foreign relations committee last session, which resulted in the addition of safeguards for the American oil industry. With these reservations, the committee approved the treaty, but the Senate did not act on it before the recess.

A little matter of $30,000,000 is involved in a House bill increasing by that much and extending for 3 years the Bureau of Mines' research on synthetic liquid fuels. The bill was approved by the House public lands committee, but got no further. The additional money was declared necessary because costs had risen since the original program was authorized; whether the amount approved by the committee will be adequate in the face of still further increases has not yet been developed.

A $100,000,000-a-year program for control of stream pollution also is awaiting action after having been passed by the Senate. The House public works committee held hearings on a similar bill but failed to approve it. A feature of the measure is a provision for Federal Works Administration loans for the construction of waste-treating facilities.

Revenge for Exports

INDEPENDENT operators who have been attempting to secure an embargo on the export of steel pipe may carry their fight to the House appropriations subcommittee in charge of Interior Department funds, with a request that it cut or eliminate the appropriation for the Oil and Gas Division because of the support Director Max W. Ball has given the Commerce Department's program for shipments to foreign countries.

Testifying recently before the House interstate commerce committee, Ball declared that a ton of steel would produce far more oil abroad than in this country, and that any oil produced anywhere in the world relieves the pressure on domestic supplies.

The independents don't agree and contend that if they had secured as much steel as has been shipped abroad in excess of prewar requirements the domestic industry would have been able to produce all the oil needed.

It is estimated that 1947 shipments of oil-field steel will approximate 321,000 tons, as compared with the 1935-39 average of 64,000 tons a year. The independents point out that for some 20 years the industry added 2,700 bbl. of reserves for each ton of steel used; on that formula, the excess steel shipped abroad would have developed 694,000,000 bbl. of oil if used in this country.

Since Ball, by virtue of his position, has been the man who most staunchly defended the export of pipe before Congressional committees, he is the natural target of the independents' attack, and they will have the support of Chairman Kenneth S. Wherry of the Senate small business committee, who is convinced that had we kept our tankers, tank cars, and tubular goods at home there would be no oil shortage—in this country, at least.

New Refineries Forecast

REFINERY-ENGINEERING contractors, whose jobs since the end of the war have been largely the revamping of existing equipment to make possible new or increased output, believe the refining industry will be ready to get into large-scale production of new plants by midsummer.

For 2 years, the engineers say, refiners, awed by the high cost of construction and the difficulty of getting materials and eager to take advantage of the ready market for what they could turn out, have been operating on a "make do" basis. At a cost of a few hundred thousand dollars, engineering contractors could draw plans, modify the equipment that was available, and provide new units.

Another factor which has deterred many refiners from building has been the uncertainty of future requirements. The automobile industry, it was known, was doing a lot of planning for motors that would require gasolines of much higher octane than is now being produced for nonaviation purposes. General Motors, for instance, was said to be preparing to introduce a car that would require 93-octane gasoline.

Prospects of several years of short supplies are believed to have stymied such plans and that, together with the steadily increasing demand for oil products, is relied upon by engineers to break the deadlock. So far, they say, everybody has been standing on the side lines waiting to see who will move first, but once someone does move a lot of others will follow and a lot of refineries will be built, some of them with an eye to the day when the motorist drives into the filling station and says, "Ten high-test high-test."

Synthetic Fuels Watched

MILITARY researchers are watching closely the development of the Bureau of Mines study of production of synthetic fuels, and as soon as usable products become available will get right down to investigations of their uses and performance in military equipment.

In view of the experience in the last days of World War II, when the supply situation began to get really tight, the military are less concerned with the cost of synthetic fuels than with their reliability and effectiveness.

Even though synthetic fuels cannot yet be produced as inexpensively as petroleum products, in the event of a war they could supply an important part of the raw materials for refining.

Realizing, however, that in the normal march of events it may be some years before a commercial synthetic-fuel industry is established, the armed forces see it as an ace in the hole, to be played when supply and not cost is the controlling factor, and are pushing ahead with a large number of investigations of present-day petroleum products.

Some of these investigations are being conducted under the wrap of

secrecy, but for others the military have called upon the industry and laboratories generally for help. Probably never before have the armed forces gone in for petroleum investigations on the broad scale now being conducted as part of a tremendous research and development program which is being pressed in the effort to overcome the deficiencies which came to light in the last war—before another war overtakes us.

In keeping with the new concepts of what the next war will be like, these investigations are bearing down heavily on fuels and lubricants efficiently usable at temperatures as low as —65°, synthetic lubricants, and rust preventives.

Costly Investigations

IF the number of Congressional investigations continues to mount, somebody soon is going to charge that one cause of the gasoline shortage is the number of trips government cars are making to haul officials to and from the Capitol, and somebody else may want an investigation of investigations to find out just what these inquiries are costing in government and industry salaries.

The 1948 version of an oil investigation appears to require that all government officials and experts who may have the slightest interest in the subject be called in, the heads of as many major companies as can be thought of summoned to Washington, and all independents who can scrape the fare together invited to attend. Then everybody sits around a committee room for a day or two and then goes home—to find another hearing is being "arranged" and will they please come back.

That, at least, was the way Sen. Kenneth S. Wherry of Nebraska staged the hearings of his small business subcommittee. Last month, Sen. Charles W. Tobey of New Hampshire called in officials of 10 companies, 7 oil and gas associations, and 7 government agencies.

Since no government official would think of appearing before a Congressional committee unless flanked by a staff of experts, this meant that anywhere up to 30 or more high-priced government men getting up to $10,000 or more a year sat around from 10 to 5, while a lot of work piled up on their desks.

Russian Report

THE Russian petroleum industry, unlike that of the United States, is not plagued by consumer demands for more than it can provide.

Under the current 5-year plan, production in the third quarter of this year was 21 per cent higher than in the same period of 1946; 1946 output was 12 per cent above that of 1945; and the oil industry in the Caucasus is expected to reach prewar output in 1949; all according to comment in the "U.S.S.R. Information Bulletin" issued through the Soviet Embassy in Washington.

Oil men know that Russian reports are vague, to say the least, and seldom willingly reveal any statistics less than 10 years old. The only specific figures in the article noted that production in 1927 was 10,200,000 tons.

Nevertheless, it is indicated that new production in the Maikop, Saghestan, and other regions of the Caucasus is being pushed to make up for the loss of output in the Baku and Grozny areas under the 5-year plan, which contemplates the restoration in 1949 of the prewar output of around 200,000,000 bbl. a year in Southern Russia.

To the oil which is being produced within the country must be added that which Russia is securing from its satellite nations and from Austria, of which no mention is made in the bulletin. It would seem that Russia is getting enough oil to meet all industrial demands, possibly plus some for storage against "the day," and for the automobiles of party members. The average Russian worker, it is reported, unlike his American counterpart, doesn't do much Sunday driving.

The bulletin report stresses the improved methods of "drilling, mining, and refining" which are being introduced. But it doesn't say whether better conservation is practiced in Russia than in the satellite countries from which it is demanding a maximum output.

Jobber Cannot Collect for Rail Freight Overcharge, Court Rules

CHICAGO.—In an opinion of broad interest to the oil industry, the Eighth U. S. Circuit Court of Appeals has reversed lower court findings in the L. D. Tucker suit which sought to recover from Pure Oil Co. freight differentials developed by changes in pipe-line rates.

The opinion, entered in St. Louis on December 26, was delivered by Judge Seth Thomas of Fort Dodge, Iowa. The case attracted wide attention, and was heard in November by a court composed of Circuit Court Judges Gardner, Thomas, and Johnsen, and was based on an appeal by the company from a decision by a Southern Iowa District Court judge.

Tucker, a gasoline jobber in Knoxville, Iowa, brought suit as counter claim to a suit filed after Tucker had defaulted on a real-estate-purchase contract with Pure. Tucker admitted material allegations of the complaint, but in his counter claim charged that the company had violated its supply contract by collecting over $10,000 more than should have been collected.

Gasoline furnished to Tucker was from Group 3 territory, and was transported from Oklahoma to Des Moines by pipe line, then to Knoxville by tank car or tank trucks. When the contract was made, the rail rate from Group 3 to Knoxville, and pipe-line plus rail rate between the same areas, was the same. Under the contract, the delivered price to Tucker was specified as that currently posted by Pure at zone offices in Madison, Wis.

In June 1941, about 21 months after signing the contract, the Interstate Commerce Commission entered an order requiring the pipe line to reduce its rate from Group 3 to Des Moines so that the combination rate through pipe line to Des Moines and by rail from Des Moines to Knoxville was less than the all-rail rate from Group 3 to Knoxville. Tucker's counter claim was based on this differential.

In the Circuit Court's opinion, Judge Thomas wrote: "It will be observed that no formula is stated for determining the price of gasoline to Tucker, and it is not disputed that the price charged at all times during continuance of the contract was the company's official delivered tank-car price to jobbers prevailing on date of shipment from storage in Des Moines, as currently posted by seller at zone offices in Madison, Wis."

Tucker continued to pay gasoline bills right up to expiration of the contract, and the only action taken was to demand credit on each month's purchases. The company had not recognized this claim as valid.

The lower court had held as a matter of law that "Tucker, by paying for gasoline as billed to him, and making protest thereof, did not waive a known right, nor did he intend to waive any rights against Pure Oil Co. for such overcharge." The Circuit Court opinion held: "This conclusion is inconsistent with the law generally and with law of Iowa particularly."

Judge Thomas declared that "Tucker's excuse that he felt a compulsion to pay monthly bills in order to protect his 5-year contract does not aid his claim. There is no evidence of any threat on the part of the oil company to cancel his contract. Judgment for Tucker on his counter claim must be and it is reversed."

Ben Harper and Gene M. Woodfin, of Houston, and Judge Donald Evans of Des Moines, were counsel for Pure.

LPG SALES gain 30 per cent

by R. W. Thomas and K. W. Rugh

THE liquefied petroleum gas industry continues its rapid growth. Within the past 3 years the total sales of the industry have more than doubled, reaching an estimated total volume in 1947 of 1,845,000,000 gal. The estimated increase in volume sold in 1947 over 1946 is almost equal to the total volume sold in 1941, the last year of normal activity preceding World War II. Liquefied petroleum gas in all of its uses is experiencing a greater and more widespread demand and acceptance than in previous years.

By no means was the market demand for liquefied petroleum gas satisfied during the past year. The volume sold was limited by a combination of several factors, such as insufficient production of appliances and utilization equipment, shortage in transportation facilities, and inability to obtain necessary materials to construct additional facilities for production of liquefied petroleum gases. A large unfilled demand for these products continues to exist and cannot be fully satisfied until these shortages are overcome.

Domestic Use Up 31.8 Per Cent

The estimated increase in the volume of liquefied petroleum gas sold for domestic purposes in 1947 over that sold in 1946 exceeded the industry's total sales for domestic use in 1941. It is estimated that sales for domestic purposes in 1947 will exceed 1,000,000,000 gal. This is greater than the industry's total sales for all uses in a year as recent as 1944 and it is almost equal to the total volume sold by the industry for all purposes 2 years ago. These figures indicate the tremendous demand for liquefied petroleum gas for homes, institutions, and commercial establishments situated beyond the gas mains. It is estimated that at the close of 1947 there were approximately 4,500,000 homes using liquefied petroleum gas for household purposes. This means that approximately 20 per cent of the homes using gas, whether natural, manufactured or L.P.G., are being served by the L.P.G. industry.

Utilization equipment and appliances continue in greater demand than can be supplied by the manufacturers. There apparently is sufficient capacity for producing utilization equipment and appliances to satisfy the demands of the industry, but the shortage in steel and other raw materials is postponing the day when ample supplies will be available to satisfy prospective users' require-

In this annual survey of the liquefied petroleum gas industry the authors make these points:

1. Sales of L.P.G. have more than doubled in the last 3 years but the market is far from satisfied.

2. Twenty per cent of all homes using gas are now served with L.P.G.

3. During 1947, domestic use of L.P.G. increased 31.8 per cent, industrial uses increased 11.6 per cent, utility use increased 55.8 per cent, and chemical uses increased 34.9 per cent.

4. Export of L.P.G., while a small portion of the total business, is growing rapidly.

5. Uniform L.P.G. safety standards are now in effect in 35 states.

6. Huge supplies of propane are available to expand the L.P.G. business but plants for recovery may cost as much as three times the cost of older plants.

7. Retail prices of L.P.G. are rising, due to higher costs.

Left: Liquefied-petroleum-gas tank-car loading rack. Right: Example of mass-production methods used in filling cash-and-carry cylinders

ments. In spite of the fact that the demand for liquefied petroleum gas appliances was not met, startling increases were made in appliance sales to L.P.G. users in 1947.

It is estimated that approximately four times as many automatic water heaters were sold for L.P.G. in 1947 as in 1946. Probably 20 per cent of the total automatic water heaters made in 1947 went to L.P.G. users. It is believed that in 1946 only 10 per cent of the total automatic water heaters produced went to L.P.G. customers. This demand for the convenience of hot water in the household was foreseen at the end of the war and it is gratifying to the industry to find L.P.G. bringing this convenience to so many more of the homes which it serves.

Indications point to twice the sales volume of household L.P.G. refrigerators in 1947 as in 1946. The demand for these appliances was far from satisfied even though the number sold was doubled over the previous year.

It is estimated that 25 per cent of all the gas ranges manufactured in 1947 were installed for L.P.G. customers.

The increasing acceptance for L.P.G. for house heating is indicated by the estimate that better than 15 per cent of the floor furnaces manufactured in the country are made for L.P.G. The number of central heating units connected to L.P.G. does not represent a large portion of the total manufactured. However, the demand is increasing each year.

R. W. THOMAS

K. W. RUGH

R. W. Thomas is manager of the research and development department, Phillips Petroleum Co., Bartlesville, Okla., and K. W. Rugh is manager, Philgas division, sales department of Phillips.

Because of increases in all elements of operating costs and in equipment costs it has been necessary generally for the industry to increase the charges to customers for making new installations. In spite of these increased charges distributors must invest more capital per new customer than formerly. Increased amounts of capital per customer are, therefore, required by the operating companies.

Higher costs in all phases of the business have resulted in the industry generally raising gas prices to consumers. Since the inception of the household use of liquefied petroleum gas, greater use has resulted in lowered costs due to increased operating efficiency and to greater saturation of customers. During the past year the upward spiral of costs has made necessary installation charge and gas price increases.

Great strides were made in increasing the storage capacity of installations for homes using L.P.G. for house heating. Because of the inability of the industry to immediately supply the winter peak requirements of customers using L.P.G. for house heating, experience has indicated the necessity for larger consumer storage. The industry is to be congratulated upon the results of its efforts during 1947 in installing greater gas storage capacity for domestic users.

Industrial Use Increases 11.6 Per Cent

There has been considerable unfilled demand for new industrial installations. The inability of the industry to supply L.P.G. to many prospective users has limited the number of new industrial L.P.G. installations. Some increase in consumption of L.P.G. in existing industrial installations has taken place; however, most of these manufacturers have long been operating at near capacity hence the opportunity was not great for increased gas sales during the past year to these existing installations.

Many industrial concerns normally using either manufactured or natural gas are installing standby storage of

(Continued on page 106)

TABLE 1—MARKETED PRODUCTION OF LIQUEFIED PETROLEUM GAS

Year	Total sales		Distribution (thousands of gallons)							
	Gal. (in thousands)	Per cent increase	Domestic*	Per cent increase	Industrial and miscellaneous†	Per cent increase	Gas manufacture	Per cent increase	Chemical manufacture	Per cent increase
1922	223	....	Sale of liquefied petroleum gas confined primarily to bottled-gas business prior to 1928							
1923	227	24.4								
1924	376	36.0								
1925	404	7.2								
1926	465	15.2								
1927	1,091	134.6								
1928	4,523	314.6	2,600	....	400	....	1,500	....	.....	....
1929	9,931	119.6	5,900	126.9	1,500	275.0	2,500	66.7	.....	....
1930	18,017	81.4	11,800	100.0	2,200	46.7	4,000	60.0	.....	....
1931	28,770	59.7	15,295	29.6	7,172	226.0	6,303	57.6	.....	....
1932	34,115	18.6	16,244	6.2	8,167	13.9	9,703	53.9	.....	....
1933	38,931	14.1	16,626	2.3	13,987	71.3	8,318	—14.3	.....	....
1934	56,427	44.9	17,681	6.3	32,448	132.0	6,298	—24.3	.....	....
1935	76,855	36.2	21,380	20.9	47,894	47.6	7,581	20.4	.....	....
1936	106,652	38.8	30,014	40.4	67,267	40.4	9,371	23.6	.....	....
1937	141,400	32.6	40,823	36.0	62,610	(‡)	11,175	19.3	26,792	....
1938	165,201	16.8	57,832	41.7	62,694	0.0	12,386	10.8	32,299	20.5
1939	223,580	35.3	87,530	51.4	93,723	49.4	15,435	24.6	26,892	—16.7
1940	313,456	40.2	134,018	53.1	124,482	34.5	20,285	31.4	34,671	29.0
1941	462,852	47.7	220,722	64.7	172,669	38.6	25,255	24.5	44,206	27.5
1942	585,440	26.5	303,857	37.3	197,149	14.3	31,366	24.2	53,038	20.0
1943	675,233	15.3	344,962	13.7	237,396	20.2	37,519	19.6	55,356	4.4
1944	898,071	33.0	455,617	29.0	254,590	7.3	45,879	22.3	151,985	175.0
1945	1,067,979	19.0	533,262	19.7	256,577	0.8	53,849	17.4	224,291	47.5
1946	1,415,840	32.6	766,150	43.7	255,375	—0.5	86,660	61.0	307,655	37.1
1947	1,845,000	30.3	1,010,000	31.8	285,000	11.6	135,000	55.8	415,000	34.9

*Household use plus other requirements by these customers such as irrigation pumping, tractor fuel, flame weeding, chicken brooding, and similar uses. Included also is liquefied petroleum gas sold by domestic distributors but used for industrial purposes internal combustion engine fuel and for gas manufacturing engines. †Includes liquefied petroleum gas sold for fueling internal combustion engines. ‡Not comparable due to segregation of chemical manufacturing.

Remarks: In this table total sales for all years except 1947, were obtained from U. S. Bureau of Mines reports. Distribution for the years 1931 to 1946, inclusive, was obtained from the same source. All other volumes were estimated by the writers. The total sales volume includes all liquefied petroleum gas (propane, butane, and propane-butane mixtures) when sold as such. Until 1944 the sale of pentane when sold for any purpose other than motor fuel blending was included. Since then it has been excluded. It does not include butane when blended with heavier petroleum fractions for motor fuel purposes. Intercompany sales transactions such as purchases of liquefied petroleum gases by one company from other companies and resold as liquefied petroleum gases have been eliminated in order to avoid duplication of sales figures. The data do not reflect sales of liquefied petroleum gases used directly by the producer at the point of production for fuel, polymerization, solvent dewaxing, etc. Neither do the figures include sales of hydrocarbons to plants manufacturing synthetic rubber or aviation gasoline or their components.

Marshall Plan Costs Due for Close Paring by Congress

WASHINGTON.—The first of many hearings which are expected to be held on the Marshall plan will open before the Senate foreign relations committee January 7, with the Republican leadership in Congress openly in opposition to committing the country to a 4-year spending program.

This, however, is only one of several angles which will be thoroughly studied before legislation authorizing the program goes to the floor of House or Senate.

No Congress can bind a succeeding Congress, but Republican leaders don't want to authorize the expenditure of a fixed sum over a given period of time for fear it might become a commitment on which foreign governments would rely, leading to international complications in the event unforeseen changes in the situation at home or abroad made radical changes in the program necessary. They are seen as willing, however, to put something in the preamble of the legislation which would permit the program to go ahead, from year to year.

Another fight is expected over the $17,000,000,000 asked by President Truman and the $6,800,000,000 presented as the cost for the first 15 months. The latter figure already has been attacked as showing only part of the cost, which is estimated in some quarters at more than $8,000,000,000.

Both the over-all cost of the program and the initial expenditure are expected to be pared down by Congress when it gets around to discussing the financial aspects of the legislation. The mere fact that something like $5,000,000,000 has already been trimmed off the estimates of the Committee for European Economic Cooperation has convinced legislators that the cost can be further reduced without impairing the recovery program.

The question of cost will involve the question of availability of raw materials and commodities needed by Europe and this, in turn, will lead to studies of the situation in the oil, steel, and other industries such as were made during the special session in connection with interim aid for France and Italy.

A strong effort is expected to be made to trim the role which the State Department will play in the administration of the program. There is a great deal of suspicion at the Capitol—as well as in such quarters as the oil industry—that the department is so concerned with diplomatic "situations" that it loses sight of the needs and limitations of our own economy.

Many members of Congress want the handling of the program placed with a bipartisan board as suggested by a committee headed by Rep. Christian A. Herter of Massachusetts, which made an exhaustive study of the European situation last summer. Such a board could employ industrialists who would be competent to schedule exports so that, for instance, production machinery would not be shipped until the factory for which it was intended was built to receive it. That, say critics of the State Department, is something its officials might overlook.

Price Freedom Favored by Council

WASHINGTON.—President Truman's Council of Economic Advisors threw a monkey wrench into his plans for price control in a report to him that real price competition is the most essential single factor needed to restore the national economy to proper balance.

Singling out inflation, the high cost of living, and a threatened recession, as the problems which must be attacked vigorously before the end of 1948, the council declared that industrial prices and profits will have to be reduced and "gross imbalances" in the wage structure rectified if stabilization is to be achieved.

The council was set up under the Employment Act of 1946 to study and report annually on the health of the national economy and the steps needed to keep it strong.

More than the "full employment" contemplated under the act is necessary for a healthy economy, it told the President.

"We were astonished to find, after the country had reached the idealized figure of 60,000,000 jobs, that the volume of production still was disappointing," the council said. "And with production shortages, we also found that abundant monetary purchasing power confronted us with inflationary dangers rather than calling for adequate production."

Present heavy production, it was found, is due to abnormal circumstances such as military expenditures, foreign aid, temporary crop shortages and wartime backlogs of orders for consumer and durable goods. Mere acceleration of production, the council held, will not solve the problem.

"It will simply advance the time when we shall have to face the problem of what price, income, and property-value adjustments have to be made to strike an internally consistent or stable equilibrium," the report said. "It seems clear that in reaching this equilibrium many industrial prices must come down at least in relation to other prices."

But most important of all, the council intimated, is free competition in industry.

"In any composite of salutary policies," it declared, "none is so significant as the achievement and maintenance of real price competition, which means the lowest price consistent with a fair return in a stable economy rather than the highest price that the traffic will bear in an unstable economy."

Antioch Unitization Hearing Set for January 6

The hearing for unit operation of the Gibson sand zone of southwest Antioch pool in Garvin County has been set for January 6. The application seeking unitization was recently filed with Oklahoma Corporation Commission by the following six operating companies: Globe Oil & Refining Co., Vickers Petroleum Co., Devonian Oil Co., Anderson-Prichard Oil Corp., Sunray Oil Corp., and Phillips Petroleum Co.

The unit would be composed of 2,680 acres in Township 3n-2w, southwest of the town of Antioch. Gibson sand production is at 6,200 ft. on the east side of the field and at 6,500 ft. on the west side. There are 67 wells completed in the zone.

Sun Leases 12,000 Acres In Galveston Bay Area

HOUSTON.—Filing of 19 oil and gas leases here recently showed that Sun Oil Co. had leased more than 12,000 acres in Galveston Bay from the State of Texas for $452,668. Sun, high bidder for the tracts which varied from 594 to 1,183 acres, paid considerations ranging from $5,918 to $101,120.

Texas Standard Moves Offices to Dallas

Standard Oil Co. of Texas is moving its North and East Texas headquarters from Wichita Falls and Tyler, Tex., to Dallas, where the company will maintain geological, producing, land and other departments.

District offices in Tyler, Abilene, Amarillo, and Wichita Falls will be discontinued and moved to Dallas.

PERSONALS

Minckler Named Head Of General Petroleum

EFFECTIVE the first day of 1948 R. J. Minckler, executive vice president of General Petroleum Corp., begins his duties as president of the company, succeeding S. J. Dickey, who is retiring.

Minckler was elected executive vice president of the company in June 1947. During the past year he has served as a member of the 15-man Military Petroleum Advisory Committee appointed by Secretary of the Interior Krug to advise the Army and Navy on petroleum matters.

Born in Minneapolis, Minckler's first job was that of oil boy with the Great Northern Railway. He served in the Army during the first World War and later attended the University of Washington, majoring in business administration. In 1924 he joined General Petroleum Corp., becoming assistant to the president 10 years later. In 1941 he was elected a director. He served as director for the Kettleman North Dome Association for several years.

During World War II Minckler served as director of petroleum supply of the Petroleum Administration for War in Washington.

David P. Hankins, assistant superintendent of Pure Oil Co.'s Cabin Creek, West Va., refinery, has been made superintendent of the refinery effective January 1. Hankins has been with Pure for 23 years and at Cabin Creek for 12 years. He succeeds **Clifton W. Cooper,** superintendent since June 1945, who is being transferred to the company's Chicago office on assignments in the company's refining division. **Harold P. Sanders** has been named assistant superintendent of the refinery to succeed Hankins.

Fred W. Lake, of Los Angeles, assistant in charge of the production department of Wilshire Oil Co., has moved to Midland, Tex., to direct drilling operations of the company's deep wildcat in West Upton County. **Ernest L. Berg,** district geologist for Wilshire in the Permian basin, also has moved to Midland to establish headquarters for the company in that territory.

L. F. McCollum, recently elected president of Continental Oil Co.; **W. C. MacMillan,** Continental vice president in charge of production; **Harry J. Kennedy,** vice president in charge of marketing; and other company officials were in Houston last week as a part of an inspection tour of Continental properties.

G. G. SMITH

L. G. Smith, vice president of Creole Petroleum Corp. in charge of refining, has been elected a member of the Creole board of directors. Resignation of **W. J. Haley** and **W. R. Goodwin** as members of the board has been announced by the company. Smith, who has been active in the petroleum industry since 1913, has been a Creole vice president since September. He was general manager and later president of the Lago Oil & Transport Co., Ltd., Aruba refinery and before his Creole position was in the foreign refining department of Standard Oil Co. (N.J.)

Earl A. Tarver, Mark E. Stump and **Fred G. Phelps** have opened offices in the McBirney Building, Tulsa, as geological consultants.

L. H. Mathews has been appointed electrical superintendent, producing department, General Petroleum Corp., and **P. R. Rundell** has been named assistant electrical superintendent.

Earl L. McNeill, formerly drilling and production superintendent of Crown Central Petroleum Co., has joined Coast Co. as drilling superintendent. McNeill has previously served also with Skelly Oil Co. and Allied Well Service, Inc. Coast Co. is the production affiliate of Tennessee Gas Transmission Co.

Robert W. Worthing, geologist with Stanolind Oil & Gas Co., has been transferred from Tallahasse, Fla., to Oklahoma City.

B. C. CLARDY

B. C. Clardy was reelected president of Stanolind Pipe Line Co. early this week at a directors' meeting. **J. L. Burke,** former vice president, was elected executive vice president; **J. L. Shoemaker,** former comptroller, was named financial vice president; **F. A. Mathis,** former assistant comptroller, was elected comptroller; **W. O. Middaugh,** former executive assistant to the president, was named secretary; and **Wilkes Keith,** formerly head of the tax and statistical section, was elected treasurer.

Siam Kurem, an official of Petrol Ofisi, an agency of the Turkish Government dealing with petroleum products, is in this country to purchase lubricating oils.

Dwight E. Shoemaker, of Abilene, Tex., scout for Humble Oil & Refining Co., has been elected president of the West-Central Texas Oil Scouts Association. Other officers are: **William P. White,** Sinclair Prairie Oil Co., first vice president; **Kenneth Kerfoot,** Crown Central Petroleum Co., second vice president; **Cletus Duty,** Woodley Petroleum Co., reelected secretary-treasurer, **James W. Steward,** Pan American Production Co., entertainment chairman.

Sheikh Hamad bin Sheikh Mohamad, cousin of the ruling sheikh of Bahrein Island, will enter Stanford University with the beginning of the winter quarter January 3. The sheikh, who is 24, arrived in New York December 22. He attended Beirut High School and studied 2 years in the American University of Beirut.

C. C. Gandaubert, formerly drilling superintendent for General Petroleum Corp.'s southern division, has been named assistant superintendent for the southern division with offices at Vernon, Tex. He will be succeeded by **A. L. Hair,** formerly drilling foreman in the coastal division. **J. J. Oli-**

PERSONALS

phant, formerly assistant to the superintendent in General Petroleum's San Joaquin division, has been promoted to production superintendent in that division.

S. J. Dickey, president of General Petroleum Corp. since 1941, and **R. A. Sperry,** senior vice president and director, have retired effective January 1. **R. L. Minckler** has been named to succeed Dickey. Having gained broad engineering experience after his graduation from the University of Pennsylvania in 1904, Dickey joined General Petroleum in 1919 and was made chief engineer in 1920, a director in 1927, and vice president in charge of manufacturing in 1930. During the first World War Dickey was appointed to direct the development of processes, design and installation of two major plants on the Pacific Coast to produce toluene for the production of T.N.T. Sperry joined the company in 1912, becoming a director in 1925, and a vice president in 1926.

S. J. DICKEY

R. A. SPERRY

W. M. Vaughey, of Jackson, Miss., independent producer and president of the Mississippi-Alabama division of the Mid-Continent Oil and Gas Association, has been named a colonel on the staff of Gov. Fielding L. Wright of Mississippi.

G. H. Card, North Texas-New Mexico division superintendent for Stanolind Oil & Gas Co.; **T. H. Andrews,** assistant division superintendent; and **A. R. Johnson,** division industrial relations superintendent, were in charge of the company's recent 2-day divisional meeting at Fort Worth. District superintendents present for the 2-day session included: **F. J. Schempt,** Greggton; **J. E. Wootton,** Lubbock; and **L. E. Sloan,** Midland, Tex. Area superintendents present were: **F. A. Schell, Jr.,** Greggton; **L. L. Bechtel,** Brownfield; **Jake Claiborn,** Imperial; **F. L. Gehr,** Wink; **C. C. Harbour,** Nocona; **E. J. Harmon,** Iraan; **F. F. Kennedy,** Pampa; **A. J. Knopp,** Odessa; **R. L. Morton,** Farmington; **C. R. Nichols,** Andrews, Tex.; and **R. C. Hendrickson,** Hobbs N. M.

Dr. Linus C. Pauling, chairman of the division of chemistry and chemical engineering of the California Institute of Technology, has been elected president of the American Chemical Society for 1949.

Mark E. Andrews, Houston oil man, will be nominated as assistant secretary of Navy when the Congress convenes, the White House has announced.

J. L. Culbertson has become chief engineer of Trans-Arabian Pipe Line Co. and is making his headquarters in the company's San Francisco offices. He succeeds **Harry B. Britton** who became chief engineer of Middle East Pipe Line Co. at New York.

Eugene F. McCabe, who was recently made vice president of Tide Water Associated Oil Co., has had more than 25 years' service with the company in its eastern division sales department. McCabe will continue in charge of that department. He was general sales manager before his recent appointment.

Ernest O. Thompson, who has been associated with the oil industry many years and who is now chairman of the Texas Railroad Commission, has announced he is a candidate for re-election to the commission.

Rolland W. Garwood, who has been with Socony-Vacuum Oil Co., Inc., in Colombia for the past 9 years, has been transferred to New York in the foreign producing department where he will handle Colombian affairs. In Colombia Garwood was the geological field supervisor of Socony-Vacuum Co. of Colombia.

Jim L. Huitt has been appointed to a fellowship at the University of Oklahoma for research work on the catalytic dehydrogenation of normal butane. Huitt, a graduate assistant in the school of chemical engineering, was granted the fellowship by Aluminum Co. of America.

Election of **Robert W. Miller,** widely known California industrialist, to the board of directors of Standard Oil Co. of California, has been announced by **H. D. Collier,** board chairman. The action was taken at a meeting of the board on December 9. Miller also is president of Pacific Lighting Corp. and director of American Trust Co., The Paraffine Companies, Inc., Tucker Investment Co., and Pacific Public Service Co.

J. Howard Tinkham, right, Pacific Coast representative of The Oil and Gas Journal and Petroleo Interamericano, is shown here receiving a certificate of regular membership in the Los Angeles chapter of Nomads from Elmer L. Decker, Martin Decker Corp. Associate inductees, center, are John Regan, Regan Forge & Engineering Co., and Vernon A. Mitchell, Security Engineering Co., Inc. The presentation took place at the December meeting of the Los Angeles chapter

Robert Galeski, formerly with United Geophysical Co., has joined the Los Angeles staff of Honolulu Oil Corp.

Raymond T. Nelson has been transferred to Corpus Christi as district landman for Superior Oil Co. in the Southwest Texas district. During the past 2 years, Nelson served as landman in Superior's Houston office.

Allen S. James has been appointed assistant to the president of Warren Petroleum Corp., effective January 1. A former newspaper and magazine writer, James joined Warren in 1940. After gaining experience in various departments of the company, he was sent to Washington in 1941 and spent most of his time until August 1947 in liaison work between the company and various war agencies of the Government. James resigned as manager of the Mid-Continent bureau of National Petroleum News to join the Warren organization. Previously he had served as Mid-Continent manager of Platt's Oilgram and before that had spent several years as a newspaper reporter and editor.

H. F. Sheets, board chairman of Socony-Vacuum Oil Co., Inc., is now on a business trip in Latin America and is expected back in February.

Jack H. Sigmon, of Gulf Oil Corp., Amarillo, Tex., has been elected president of the Panhandle (Texas) Oil Scouts Association. Other officers named were: **B. L. Anderson,** Pampa, Skelly Oil Co., first vice president; **Fred S. Alexander,** Amarillo, Stanolind Oil & Gas Co., second vice president; and **Fred D. Mason,** Amarillo, Superior Oil Co., secretary-treasurer.

Carl Barker, manager of the general tax department of Shell Oil Co., Inc., has been elected president of the Tax Institute, a nation-wide organization which collects and publishes objective tax information.

Don O. Chapell, formerly division geologist at San Antonio for Sunray Oil Corp., has been named vice president of the company and will direct the new department of exploration. Chapell graduated from the University of Oklahoma in 1932 with a degree in geology. He later became district geologist for Shell Oil Co., Inc. When Transwestern Oil Co. was acquired by Sunray, Chapell who was serving as division geologist at San Antonio for Transwestern, was made manager of Sunray's Southwest Texas land and geological office at San Antonio.

SHIFTS—

T. S. Green, foreman, Republic Exploration Co., Halletsville to Victoria, Tex.; **Robert J. Holley,** engineer, Gulf Oil Corp., Odessa to Fort Worth, Tex.; **D. E. Cook,** geologist, Gulf Research & Development Co., Pampa, Tex., to Pineville, La.; **L. Kube,** engineer, Phillips Petroleum Co., Phillips, Tex., to Bartlesville, Okla.; **John W. Benedict,** engineer, The Texas Co., San Antonio, Tex., to Casper, Wyo.; **James D. Bushnell,** engineer, Standard Oil Co. (Ind.), Whiting, Ind., to Nelsonville, N. Y.

J. O. Laws, foreman, Amerada Petroleum Corp., Scott City, Kans., to Lamar, Colo.; **Elmer E. Moelling,** foreman, Olson Drilling Co., Elk City to Purcell, Okla.; **James S. Hopkins,** foreman, Amerada Petroleum Corp., Ardmore, Okla., to Delano, Calif.; **C. H. Danchertsen,** engineer, Amerada Petroleum Corp., Seminole, Okla., to Midland, Tex.; **Donald W. Hoey,** engineer, William M. Hoey, Contractor, Lyons, Kans., to Seminole, Okla.; **E. S. Miles,** engineer, Phillips Petroleum Co., Smackover, Ark., to Vernon, Tex.

E. J. Bruce, superintendent, Wheless Drilling Co., Lewisville, Ark., to Ruston, La.; **Guy J. Andersen,** superintendent, Pure Oil Co., Saginaw, Mich., to Newark, Ohio.; **Theodore Klug, Jr.,** superintendent, Pure Oil Co., Goodhope, La., to Corpus Christi, Tex.; **W. M. Saxon,** engineer, Pure Oil Co., Saginaw, Mich., to Billings, Mont.; **S. D. Wells,** superintendent, Pure Oil Co., Seminole to Hominy, Okla.

L. R. Whitson, engineer, O.W.R. Oil Co., Piedmont, Calif., to Dallas, Tex.; **William E. Richards,** engineer, Humble Oil & Refining Co., Raymondville to Pleasanton, Tex.; **Robert A. Wiegand,** engineer, Sinclair Refining Co., Jermyn to Marcus Hook, Pa.; **Lewis H. West,** engineer, Texas Eastern Transmission Corp., Norwood to Waynesburg, Pa.; **L. J. Wickenhauser,** engineer, Gulf Oil Corp., Denver, Colo., to Barcelona, Venezuela, S. A.; **C. T. Riley,** superintendent, Superior Oil Co., Rifle, Colo., to Midland, Tex.; **Edward Strunk,** engineer, Phillips Petroleum Co., Bartlesville to Sweeny, Tex.

DEATHS

Jess R. Scarborough, 58, vice president and director of Mid-Continent Petroleum Corp., died December 26 in Tulsa. He began his oil career in 1918 as a roustabout and tool pusher. In 1924 Scarborough was made superintendent of Mid-Continent's land department, and in 1936 was selected a vice president.

Hollis B. Fairchild, 55, general manager of Standard Oil Co.'s marketing department and president of California Asphalt Corp., an affiliate company, died December 26 in San Francisco.

B. E. Morehart, 67, West Texas independent oil operator who came to Texas from Ohio in the early days of the Ranger boom, died December 22 in Cisco, Tex.

James Newton Owen, 55, oil operator of Wink, Tex., died December 20 in Wink.

Elmer W. Perry, oil well driller of Okmulgee, Okla., died December 19 in Okmulgee.

M. C. Rodolf, 55, formerly counsel for Oklahoma Natural Gas Co. and more recently member of a law firm which represented the company, died December 22 in Tulsa.

Frederick E. Berner, 42, clerk in the refining department of The Texas Co. of 26 years, died December 21 in Anahuac, Tex.

C. C. Longmire, owner of the Fort Worth Drilling Co., died December 26 in Fort Worth.

Thomas B. McComb, 51, Conroe, Tex., oil operator, died December 25 in Conroe.

E. W. Baker, 62, engineer for Humble Pipe Line Co., died December 21 in Webster, Tex.

Paul A. Devereux, 51 district manager for Sun Oil Co. at Detroit, Mich., died December 21 in Grosse Pointe, Mich.

Walter B. Nichols, 63, oil well driller of Tulsa, died December 15 in Austin, Tex.

Robert H. Acre, 81, oil and gas lease broker who had twice served in the Indiana State Legislature, died December 12 in Enid, Okla.

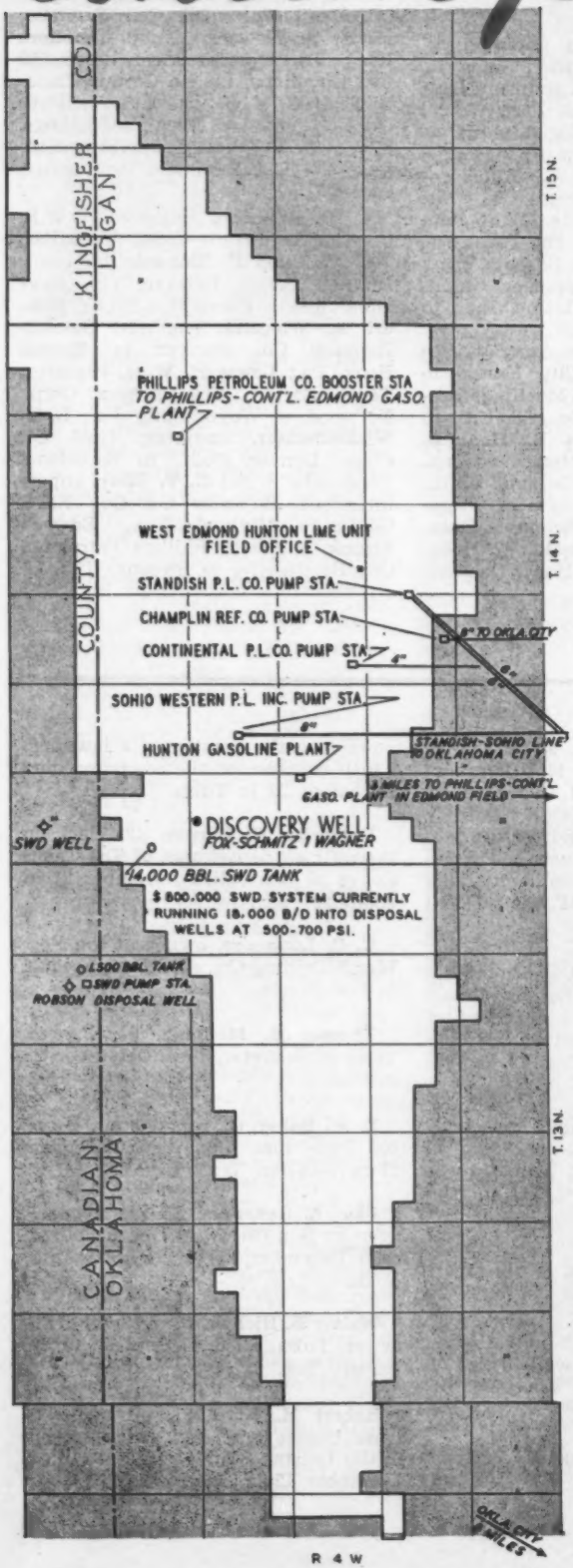
NATION'S LARGEST

Unit Operation

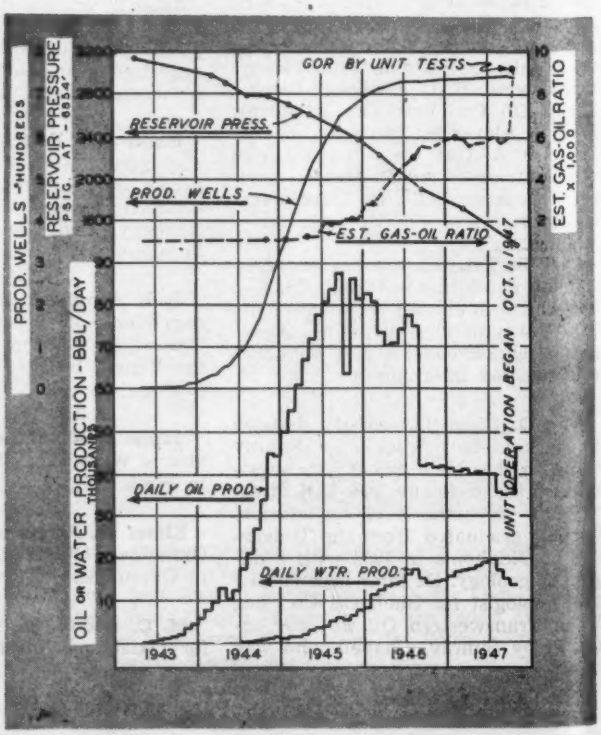
Accomplishes Much in First Three Months . . .

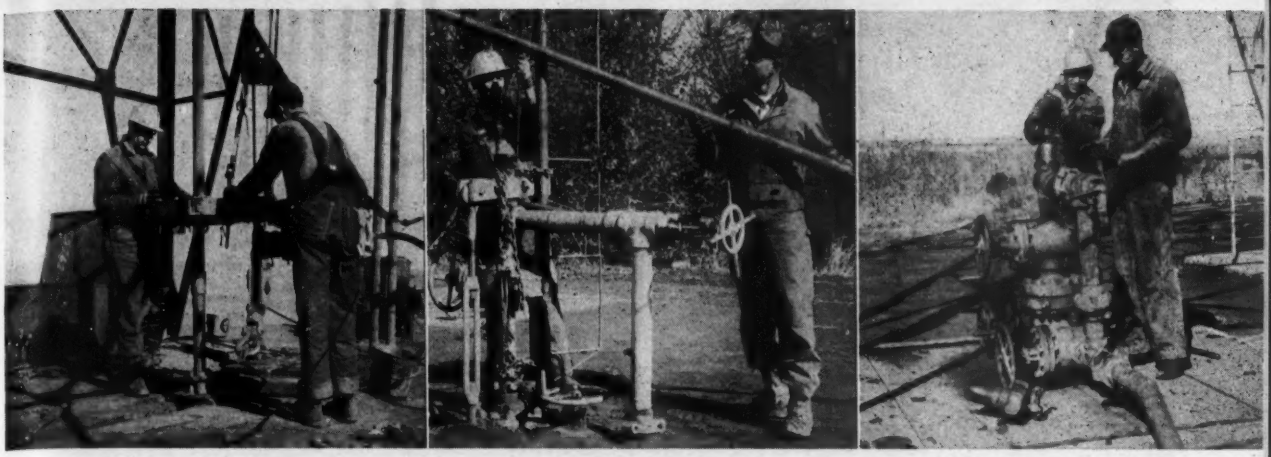
by Leigh S. McCaslin, Jr.

THIS article deals with the engineering and operating steps taken in the first 3 months since the nation's largest oil field unit operation changed from the "planning and paper-work" state into an "actual operating" organization. It tells how the ground-work of petroleum-engineering plans is now being translated into reduction of gas-oil ratios and conservation of gas energy. Further, it explains how the new unit works—the organizational setup, changes in accounting records, etc. In brief, this is the newest of a number of Journal reports on this major field (other references at end of article)—and it gives "the unitization story of West Edmond."



Left: Outline map showing major points of interest in Oklahoma's 30,000-acre West Edmond field. Below: Pool-performance chart shows graphically the declining reservoir pressure and production of recent years and also the considerable rise in producing gas-oil ratio



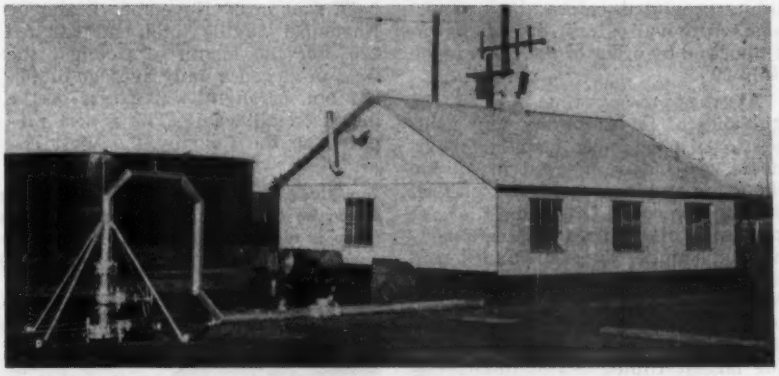


Left: A. L. Collins and W. A. Crownover, well-service crew members, use air tongs to break out tubing. Center: All wells in field are scraped regularly—at intervals varying from 2 weeks to 2 months—to remove paraffin. Joe Adamson is holding scraper as Claude Thornton prepares to raise it into position. Right: Bottom-hole-pressure crew—Ralph Lawrence and Clifford Poindexter—prepares to rig up lubricator to take another pressure reading in the field-wide survey

THINGS are humming in Oklahoma's 30,000-acre West Edmond field where, on October 1, Sohio Petroleum Co. assumed control of the field from its former 32 operators. Sohio is operator of the West Edmond Hunton Lime Unit, first unit formed under the Sooner State's pioneering House Bill 339, a bold step forward in the conservation of the nation's oil and gas.

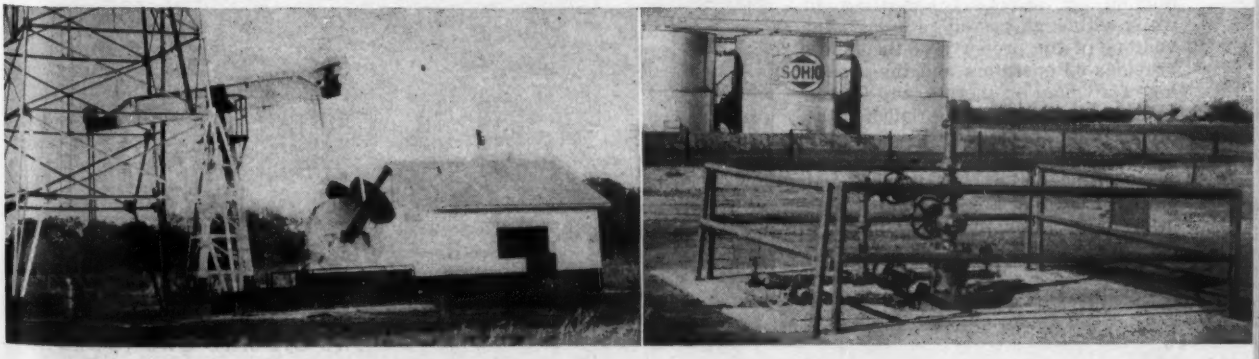
House Bill 339 provides, if unitization is desired, that 50 per cent of the operators of a field can petition the Oklahoma Corporation Commission for such action. This body will hear the arguments for unitization and either grant or deny the request. If the request is granted, a 60-day period is provided during which the unit may be voided by the filing of protests by the lessees of 15 per cent of the area. If the order is not successfully protested, the law requires compulsory communization of all lease interests and all royalty interests, regardless of whether or not these interests approve of unitization. The law is based on the theory—and general industry-wide acceptance—that the full benefits of pressure maintenance, gas repressuring, water flooding, or reservoir control, can only be achieved by handling the entire reservoir as a single unit.

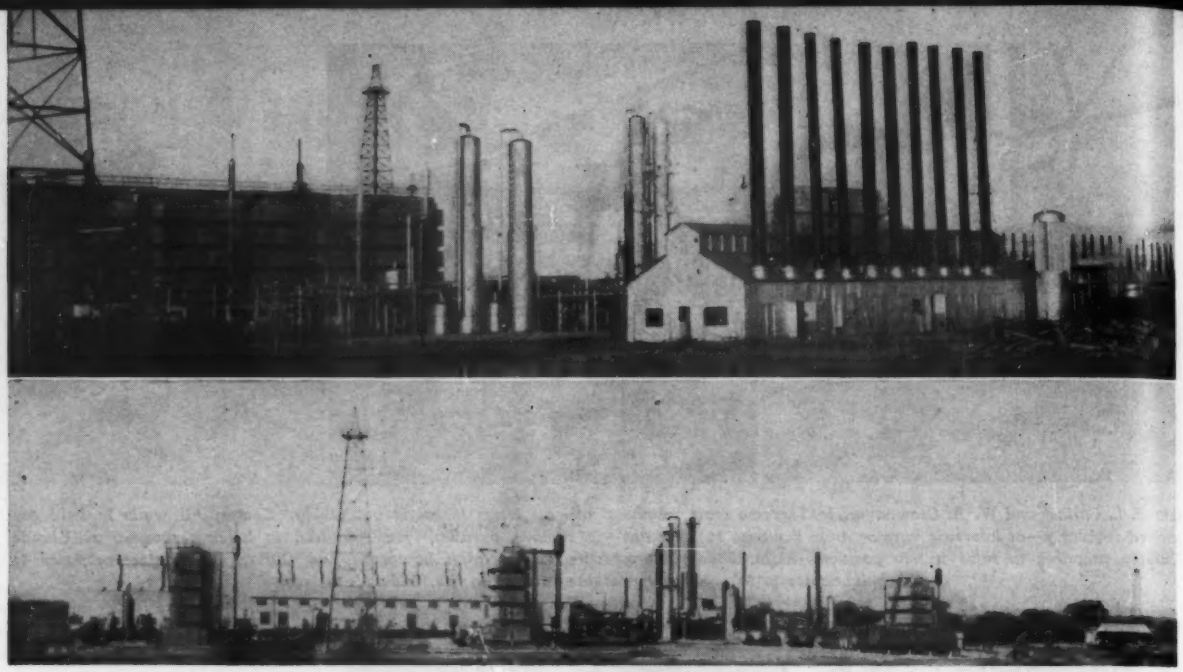
This 14,000-bbl. buried tank is part of the field's $800,000 salt-water-disposal system



Salt water is currently being run into disposal wells at the rate of 18,000 bbl. per day under 500-700 psi. pressure. This picture shows storage tank and pump station at the Robson disposal well

Left: One of the many large beam-pumping units which contribute to the field's current production of 45,000 bbl. per day from a depth of 7,000 ft. Right: Well-kept well head at flowing well. Concrete pad in foreground is used to provide a firm foundation for well-servicing units in inclement weather





Top: This gasoline plant in the old Edmond field, 3 miles to the east, is jointly owned by Phillips Petroleum Co. and Continental Oil Co. and processes much of the West Edmond gas. Bottom: The Hunton gasoline plant which is located near center of West Edmond field

In the case of West Edmond, application for unit operation was filed with the Oklahoma Corporation Commission January 29, 1947, and hearing on the application began March 18. The hearing closed after 19 days of arguments with an estimated 500,000 words of testimony and 325 exhibits presented before the commission. Approval of unit operation was authorized by order of the commission July 29.

At the present time, under the guidance of H. N. Pardee, unit manager, 126 field men, including engineers, are busily engaged in solving the many problems connected with assuming control of Oklahoma's largest producing oil field which covers parts of four counties and is 18 miles long by 5 miles wide. (See lease map.) The field has 737 producing Hunton lime wells currently producing 45,000 bbl. per day from 7,000 ft., and is one of the largest United States discoveries since Pearl Harbor. For the first 6 months of 1947 it was the fourteenth largest producing field in the United States.

Major Current Activities

Major activities now under way in the field are: (1) Increasing of production by selectively shutting in wells with high gas-oil ratios, (2) inventory of the property of the field's previous 32 operators and the assessing of a valuation thereto, and (3) the gathering of engineering data for the preparation of detailed gas-injection plans.

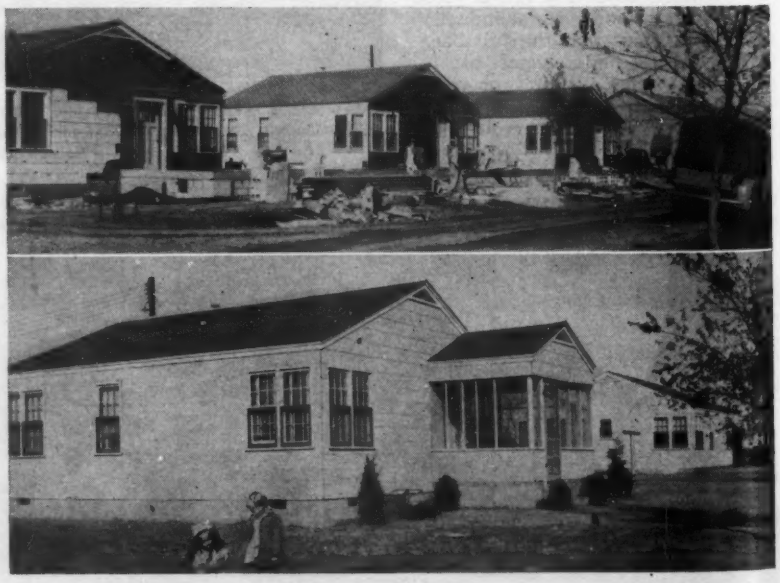
The first activity is turning out quite successful. For September, the last month prior to unitization, the field's allowable was 40,000 bbl. and production was 34,907 bbl. The unit asked the Corporation Commission to grant an increase of 5,000 bbl. of oil a day and this was granted as of October 1. It was planned to obtain this additional production by shutting in high-gas-oil-ratio wells and thus conserve this reservoir energy for increasing the productivity of the other wells in the field. Thus, 165 wells had been shut in by November 1, and by November 15 the total had reached 225. For the month of October, the field produced a daily average of 46,331 bbl. or slightly in excess of the increased allowable. The report prepared on the field by the West Edmond Engineering Committee stated that through selective production alone, an additional 10 million barrels of oil will be recovered.

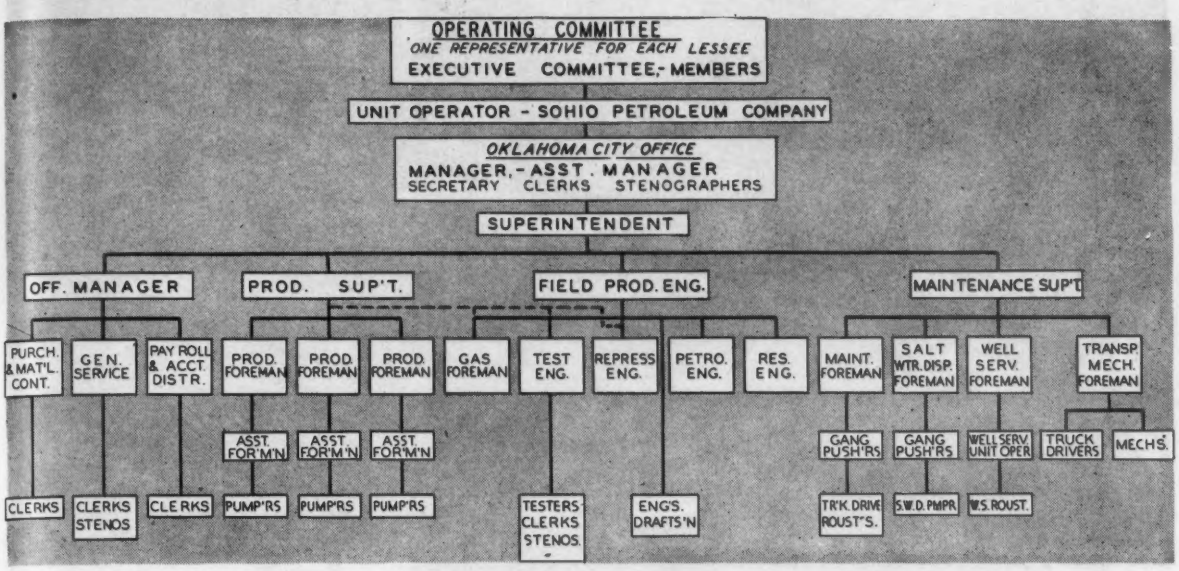
Ten two-men crews, composed of personnel on loan from the various operators interested in the field, are engaged in taking inventory. It took 6 weeks to make a field check of all equipment, and additional time to compile the information obtained in the field and assess valuation.

Engineering data being obtained for guidance in a gas-injection program

(Continued on page 62)

Top: Three lease houses of the Phillips lease camp are being remodeled and a wing built connecting the front of the houses to form field headquarters for the WEHLU. Bottom: This house is typical of the many modern lease homes built by various oil companies since the field was discovered in 1943





ORGANIZATION CHART OF THE WEST EDMOND HUNTON LIME UNIT

Highlights of West Edmond Unitization Plan

Basis

Relationship among the lessees not that of a trust, partnership, or association but in the nature of a tenancy in common. Unit does not own title to the separately owned tracts or to the leases thereon; nor shall the unit regarded as owning any of the unit production. All property shall be the property of the lessees as their interest may appear.

Operating committee

One representative designated by each lessee. The committee adopts rules and regulations, approves all expenditures proposed by the unit operator, determines well-production rates, determines gas-injection work, provides for proper auditing, appoints subcommittees.

Voting

Each lessee on operating committee has a vote equal to his proportionate interest in unit.

Unit operator

Unit operator (Sohio) shall conduct all operations in a good and workmanlike manner, keep full and correct accounts and records, issue monthly an oil-and-gas-production statement, comply with all applicable federal and state laws and regulations, carry insurance, pay all taxes.

Unit operator will pay all costs and expenses, mailing monthly to each lessee a statement. Annual budgets will be prepared.

Plan of operation

The unit shall establish and engage in pilot gas-injection projects and expand as indicated, produce wells so as to minimize water encroachment, produce oil from wells with the smallest loss of reservoir energy, and shut in wells with excessive gas-oil ratios.

Participation factor

The formula for determining the percentage participation of each well is:

$$100\left[\frac{1}{2}\,\frac{\text{Daily well allowable}}{\text{Daily field allowable}} + \frac{1}{2}\,\frac{\text{Feet} \times \text{bottom-hole pressure of well}}{\text{Sum of (feet} \times \text{weighted bottom-hole pressures)}}\right]$$

where feet is the thickness of the Bois d'Arc plus the productive thickness of the lower Hunton.

Accounting charges applicable to unit

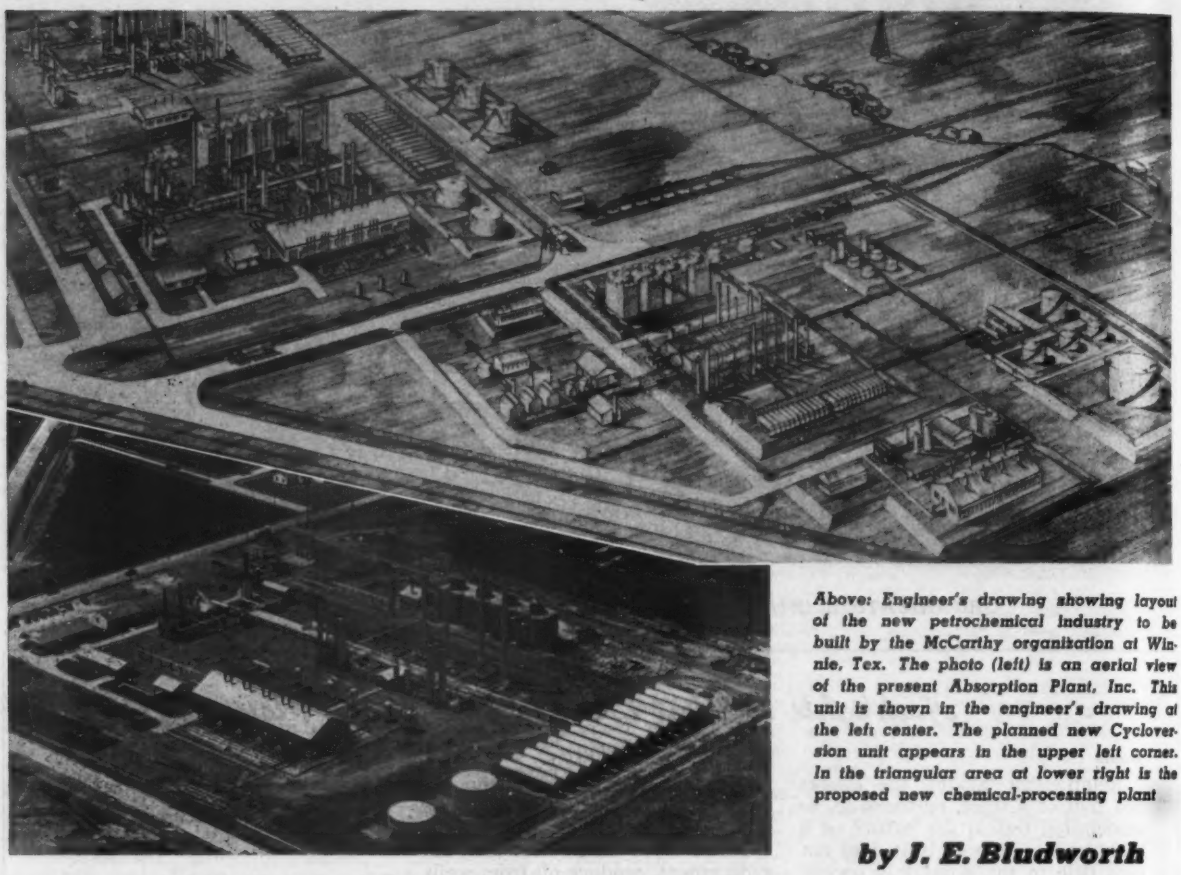
Materials and equipment at cost; moving materials; salaries and wages of unit employes; acquisition and operation of camp, warehouse and office facilities; engineering and geological; insurance (all as they apply to the unit). Overhead charges by operator (in lieu of operator's district, division, and general office expenses but not in lieu of unit area field office expense and direct unit expense) to be $13 per well per month for producing wells, $6 for wells not on production. At the end of 2 years the overhead rates shall be reduced to $10 and $5 per well per month, respectively.

Processing of unit gas

1. By the East Edmond plant owned by Phillips Petroleum Co. (50 per cent) and Continental Oil Co. (50 per cent). Additions are to be made so plant shall have capacity to gather and process 125,000,000 cu. ft. of gas per day delivered at 40 psi., and to dehydrate and deliver at 500 psi. 70,000,000 cu. ft. of residue gas per day.

2. By Hunton gasoline plant (purchased from Peppers Refining Co. by Stanolind, Sohio, and Phillips, with other lessees given option to purchase share based on unit interest). Additions are to be made so plant shall have capacity to gather and process 60,000,000 cu. ft. of gas per day, delivered at 40 psi., and to dehydrate and deliver at 500 psi. 30,000,000 cu. ft. of residue gas per day.

Both plants shall be compensated for dehydration and the 500 psi. compression at 2 cents per 1,000 cu. ft. This specific rate is affixed to the annual average of wholesale prices for all commodities in index published by Department of Labor for year 1944. If annual average for 1946 or subsequent years should vary by more than 20 points, then the rate shall be increased or decreased in proportion to increase or decrease in the annual average.



Above: Engineer's drawing showing layout of the new petrochemical industry to be built by the McCarthy organization at Winnie, Tex. The photo (left) is an aerial view of the present Absorption Plant, Inc. This unit is shown in the engineer's drawing at the left center. The planned new Cycloversion unit appears in the upper left corner. In the triangular area at lower right is the proposed new chemical-processing plant

by J. E. Bludworth

ENGINEERING COMPLETED FOR NEW

$15,000,000 PETROCHEMICAL PLANT

TO BE BUILT ON GULF COAST

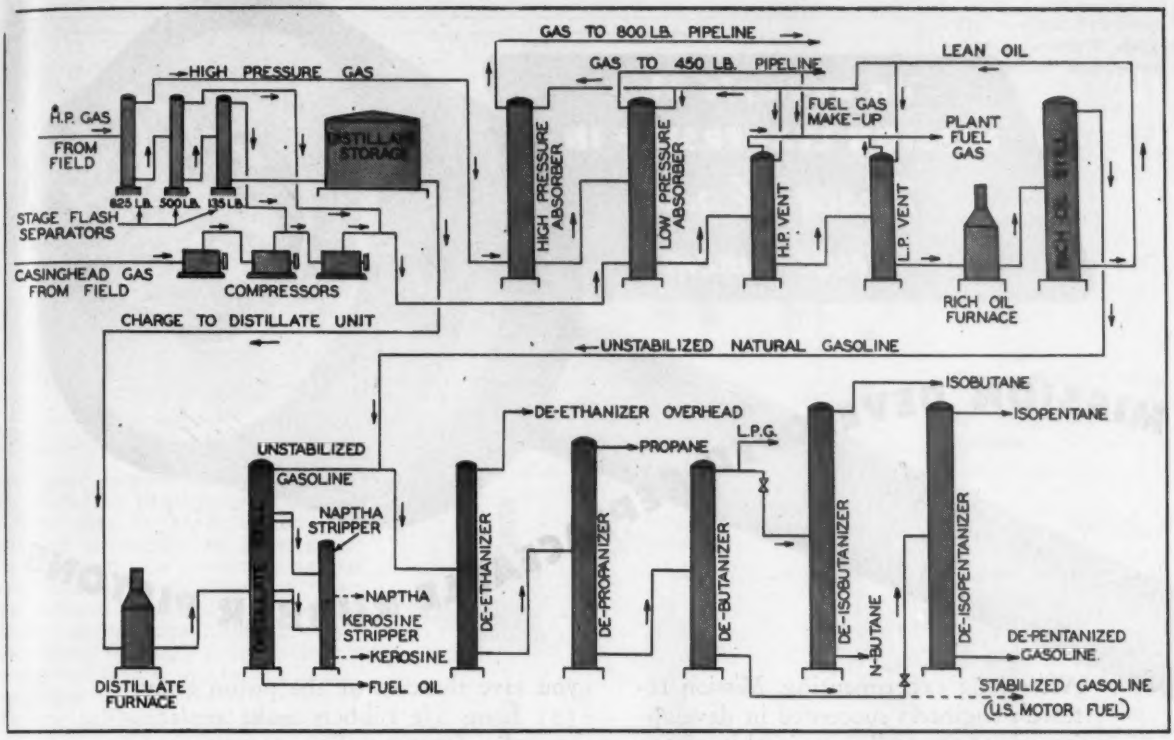
CHEMICAL-processing units, utilizing natural gas and costing in excess of $15,000,000, will be constructed at Winnie, Tex., during 1948 and 1949 by McCarthy Chemical Co., a subsidiary of McCarthy Oil & Gas Corp., Houston. The concern expects to place in operation, in the first half of 1948, units for the production of aromatic and unsaturated hydrocarbons, as well as secondary products such as formaldehyde. Other units will continue to be added as building materials are available until all units are in operation by early 1949. The plant area will cover 50 acres and in addition, acreage has been purchased on tide water for barge and deep water cargo shipments.

At the present time, Absorption Plant, Inc.,* of McCarthy at Winnie is handling approximately 100,000 M.c.f. of gas per day. By late 1948

*For engineering article on this operation, see "New Gulf Coast Gasoline Plant Serves Three Fields," by Ed Short, The Oil and Gas Journal, May 25, 1946, pp. 114-117.

GLENN H. McCARTHY *G. M. McGRANAHAN* *FRANK CHAMPION*

These three men are top officials of the McCarthy organization: G. H. McCarthy, George M. McGranahan, and Frank Champion. McCarthy is president of McCarthy Oil & Gas Corp. and McCarthy Chemical Co. McGranahan is vice president and general manager of the chemical company, vice president in charge of production of Absorption Plant, Inc., and a director and chief engineer of McCarthy Oil & Gas. Champion is president of Absorption Plant, Inc., and vice president and treasurer of the chemical company and McCarthy Oil & Gas. Other oil-industry affiliates in the McCarthy organization are Neches Natural Gas Co., and Jefferson Pipe Line Co.



This flow diagram of McCarthy's Absorption Plant, Inc., at Winnie, Tex., shows the three-stage separation of the incoming gas and distillate—the arrangement of absorption and distillation equipment—and the LPG processing units

it is anticipated that this will have increased to 250,000 M.c.f. per day. When all the company's reserves in the area have been tapped, gas will be transported by 250 miles of pipe line and will be obtained from more than 15 separate gas and oil fields. All the gas being processed is from oil or distillate wells, and, therefore, is a mixture of the lower molecular weight hydrocarbons.

The production expected of the expanded McCarthy facilities at Winnie—including existing and proposed plants—is quite impressive. A portion of the liquids recovered from the 250,000 M.c.f. of natural gas will be passed into a proposed aromatization plant. Here, using special catalysts, products will be recovered that will be combined with the untreated gasoline to produce a high-octane gasoline and provide a stream from which aromatic and highly unsaturated hydrocarbons can be obtained. It is expected that the total of these motor-fuel products will reach a sum of 272,000 gal. per day. The aromatic products may reach as high as 200,000 lb. per day. The liquefied petroleum gases which will be produced as a regular product from the existing absorption plant may reach 220,000 gal. per day. Since it is undecided at this time as to the amounts of ethylene that will be made available for sales, these figures cannot be definitely given. The proposed oxidation plant will produce approximately 600,000 to 900,000 lb. per day of combined acetaldehyde and formalin. All these products may be increased in volume output as the market conditions warrant.

Both ethylene and benzene are in great demand at the present time, and the McCarthy company is firmly convinced that both these hydrocarbons, by providing the base material for the manufacture of styrene, Polythene and Nylon, as well as other plastics, will continue to be in urgent demand. This has been emphasized by Glenn H. McCarthy, president of the organization, who has stated: "The surface hardly has been scratched in plastic manufacturing. More and more chemical production will stimulate the production of plastics and other allied products such as synthetic rubber, synthetic textiles, sulfur derivatives and any other byproducts of chemicals."

Along with the recovery of large amounts of of propane and butane, considerable amounts of ethane also will be recovered. Whereas the propane and butane will move into the usual market by tank car, the ethane must be processed near its source of recovery due to its high vapor pressure. This product will largely constitute the source of the proposed ethylene production.

Ethylene Plant Design

Early in the study of the production of ethylene it became evident that wartime processes for this operation could not continue to be competitive under the pressure of private operation. The projected plant design for ethylene production has been evolved through the technical investigations of a staff consisting of more than 50 personnel. Probably their greatest contribution toward the improved production of ethylene from ethane is associated with the use of a new catalyst which reduces the amount of methane produced during the dehydrogenation of ethane. It also allows the reaction to be carried out in a temperature range at which

The Author

Joseph E. Bludworth is a petroleum and chemical consultant with offices in Corpus Christi and Houston. Prior to last January, he was associated with Celanese Corp. of America for 12 years, several of which were as director of petroleum chemicals research and development. Before joining Celanese, he was an independent consultant with headquarters in Dallas. He has been prominently identified with the design and construction of various petrochemical installations in the Gulf Coast area. Fomac Engineers, the Houston firm with which Bludworth is associated, is coordinating the chemical engineering work for the new McCarthy project.

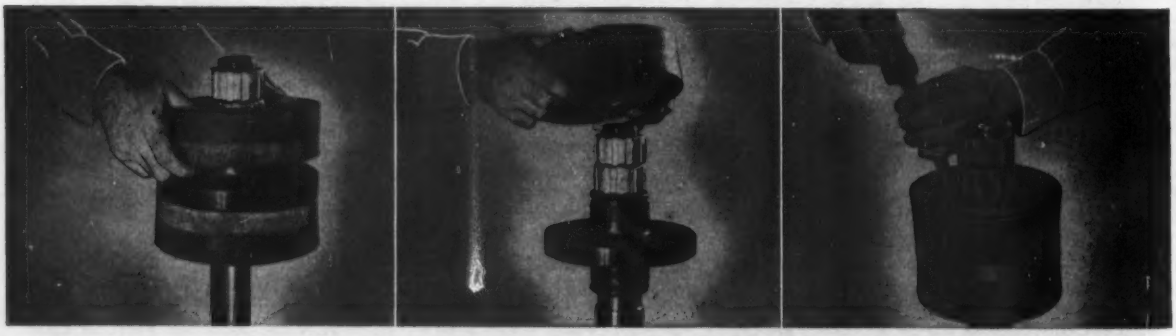
An example of
MISSION LEADERSHIP IN
Research and Development

MISSION DEVELOPED REPLACEABLE RUBBER PISTONS

After long experimenting, Mission research engineers succeeded in developing the first really serviceable piston with replaceable rubbers. In fact, Mission succeeded so well that the Mission Piston quickly became the standard of the industry.

With Mission you reduce piston renewal costs three ways: (1) It's easier to replace piston rubbers only because you don't have to remove the piston from the rod. (2) It's cheaper because you save the cost of the piston body. (3) Long life rubbers make replacement less frequent. This means there is less shut-down time when Mission Pistons are used.

Outstanding preference by majors, independents, and drilling contractors the world over, and Mission's guarantee, are your assurance that Mission Pistons are the most economical on the market to operate . . . *"Change the rubbers and save the piston."*



When the rubbers are worn, simply remove the old rubbers and save the piston body.

It's not even necessary to remove the piston from the rod. This saves you shut-down time when the rubbers are changed.

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SOLD THROUGH SUPPLY STORES EVERYWHERE

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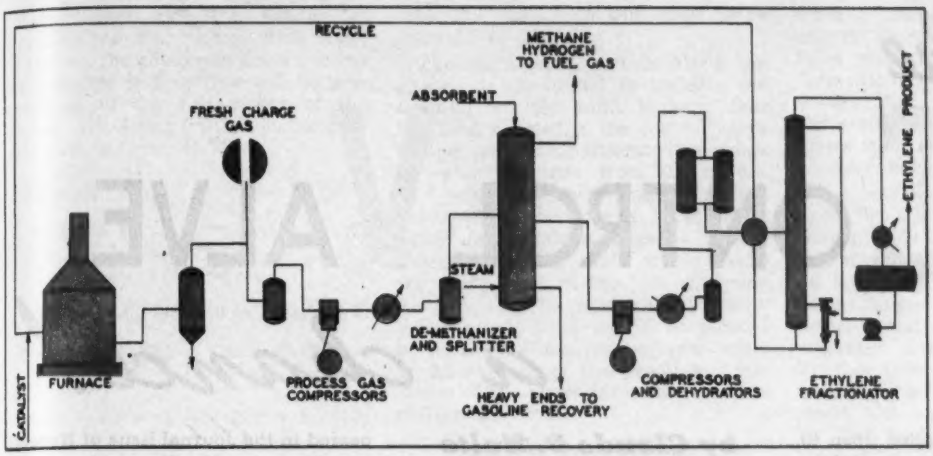
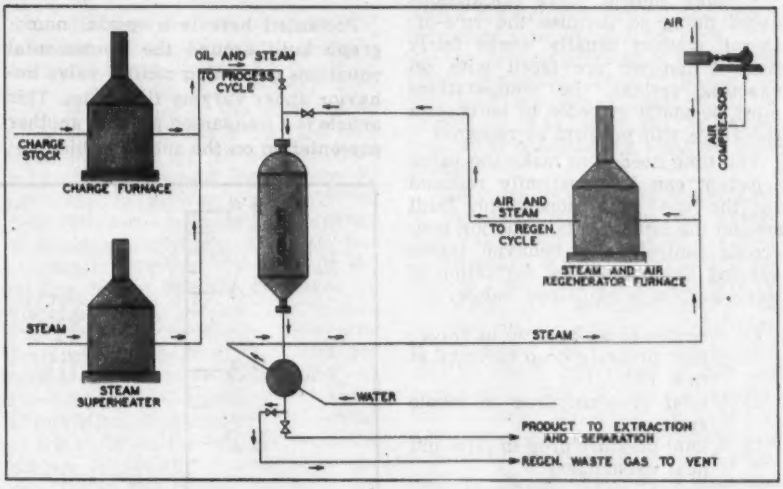


Fig. 1—(Left) Process flow in catalytic dehydrogenation of ethylene

Fig. 2—(Below) Process flow in the aromatization of aliphatic hydrocarbons



previously propane was pyrolized for the production of ethylene. These two factors, that is, lower temperature and low production of fixed gases, have resulted in a lowered plant cost and high ethylene yield per pass. Fig. 1 shows in general the process to be used in the manufacture of ethylene. When this unit is completed, it is believed that it will be the largest individual unit for the production of ethylene in the chemical industry.

Process for Aromatization

The process involved in the aromatization of aliphatic hydrocarbons is briefly outlined in Fig. 2. Several factors influenced the decision to process hydrocarbons for the production of benzene and other aromatic hydrocarbons. Neighboring chemical plants and refineries have ready use for either high antiknock motor fuels prepared from aromatics or the use of benzene and others as chemical base materials. Among these, of course, are Nylon and phenol. Also, the process is sufficiently flexible that any weakening of the chemical market for the relatively pure aromatic hydrocarbons will allow for their utilization as high octane blending compounds.

Intensive investigation has resulted in the development of direct oxidation processes with yields approaching the theoretical for the production indirectly of formaldehyde and acetaldehyde from ethylene, as well as other hydrocarbons. Unique catalysts have been devised for these processes. The number of hydrocarbons available for the above operation are relatively restricted due to the high value now being placed on propane and butane. Due to this cost situation, it is proposed to market all of the liquefied petroleum gases that can be profitably produced as long as present market prices exist. It is not planned at the present time to enter the ethylene oxide or glycol market and this will probably not be done as long as profitable outlets can be obtained for the ethylene produced.

With the nearby outlets for unsaturated gases, aromatics and liquefied petroleum gases, the formaldehyde and acetaldehyde will be obtained, at least in part, from dry natural gas. These last products will differ from the present aldehydes now being marketed from petroleum oxidation in that most of the aldehyde will be produced as a secondary product. This eliminates the objectionable features of the direct petroleum oxidation to aldehydes.

Some portions of the processes being utilized have been developed in the McCarthy organization, as well as by engineering and technical groups associated with the McCarthy companies. Other processes have been licensed in part or in whole from outside independent companies.

General Design Considerations

The Winnie area, which is 26 miles southwest of Beaumont, Tex., is only 15 ft. above sea level. However, due to the underlying strata of Beaumont clay, no particular difficulties are expected to be encountered in the construction of the plant, since the soil bearing capacity is approximately 4,000 lb. per sq. ft. Any excessive weights are to be carried by floating the equipment on steel-reinforced concrete pads. Practically all of the plants are to be built from carbon steel with the exceptions of the pipe stills and the aldehyde recovery unit where, due to the requirements of the product, stainless steel is necessary.

Two sources of water are available. Subsurface water is obtained at approximately 200 ft. At this depth water of excellent character can be obtained at a flow of 500 to 600 g.p.m. per well with no loss to water table with adequate well spread. In addition to subsurface water, another supply is available from the nearby Neches River irrigation canals. It is planned to use only subsurface water at the present time. Several cooling towers having a total capacity of approximately 50,000 g.p.m. will be utilized. These towers are spaced over the area instead of in oversized grouping in order to reduce utility line sizes.

Steam requirements will approximate 200,000 lb. per hour and will be obtained from the "outdoor" type of steam plant installation.

Several engineering firms are participating in the plant design and construction. Among these are Fish Engineering, Houston; Tellepsen Construction Co., Houston; Wyatt C. Hedrick, Houston. The over-all chemical engineering program has been coordinated by Fomac Engineers, Houston.

Give the CONTROL VALVE a chance!

by Claude B. Nolte

Presented here is a special nomograph built around the fundamental equations governing control-valve behavior under varying flow rates. This article is a companion piece to another presentation on the subject which appeared in the Journal issue of November 29, page 65. The author, with Barton Instrument Co., Los Angeles, is a member of the Southern California Meter Association, Long Beach and Los Angeles, and this paper is presented here through special arrangements with the association.

MOST of us who are called upon to make control valve calculations avoid doing so because the rule-of-thumb method usually works fairly well. When we are faced with an exacting system, the computations must be made in order to be certain the valve will perform as required.

The time needed to make the valve selection can be drastically reduced by the use of a nomograph built around the fundamental equation governing control valve behavior under varying flow rates. The derivation of this equation is explained below:

- D_v = design pressure drop in valve
- D_f = new pressure drop in valve at new flow
- D_t = total pressure drop in whole system
- D_p = total pressure drop in pipe and heat exchangers
- C = over-all valve coefficient
- Q_1 = design flow rate
- Q_2 = new flow rate
- Q_m = maximum capacity of valve at design pressure drop
- L_1 = initial valve loading
- L_2 = final valve loading
- L = change in valve loading, L_2/L_1
- R = change in flow rate
- F = fraction of friction in valve

By definition:

$$Q_m = C\sqrt{D_v} \quad (1)$$

$$Q_1 = CL_1\sqrt{D_v} \quad (2)$$

$$Q_2 = CL_2\sqrt{D_f} \quad (3)$$

$$Q_2 = RL_1Q_m \quad (4)$$

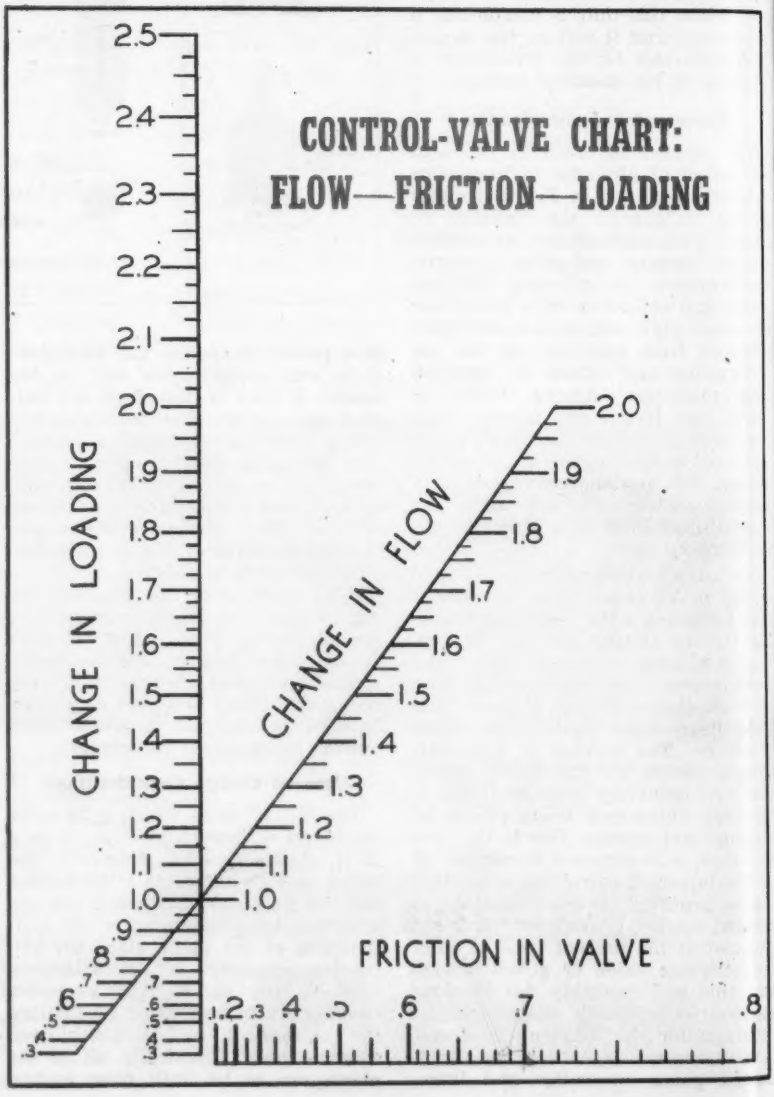
Substituting Equation 3 in Equation 4:

$$CL_2\sqrt{D_f} = RL_1Q_m \quad (5)$$

Substituting Equation 1 in Equation 5 and rearranging:

$$\frac{L_2}{L_1} = \frac{R\sqrt{D_v}}{\sqrt{D_f}} \quad (6)$$

The pressure loss in piping is actually a function of the flow raised to the 1.84 power instead of 2.0 as is generally assumed. The 1.84 power more ac-



curately cares for the change in Reynolds number with altering flow. Therefore, the change in fixed friction for a change in flow rate will be proportional to the 1.84 power of the change. The fixed friction at the new flow rate becomes $R^{1.84}D_p$.

By definition:

$$D_t = D_p - D_p^{1.84} + D_v \quad (7)$$

$$D_p = D_t - D_t \quad (8)$$

Substitute Equation 8 in Equation 7:

$$D_t = (D_t - D_v) - (D_t - D_v)R^{1.84} + D_v \quad (9)$$

$$\frac{D_t}{D_t} = (1 - F) - (1 - F)R^{1.84} + F \quad (10)$$

Divide by D_t and simplify:

$$D_t = D_t\,[R^{1.84}(F - 1) + 1] \quad (11)$$

Substitute Equation 11 in Equation 7:

$$\frac{L_2}{L_1} = L - \frac{R\sqrt{D_v}}{\sqrt{D_t\,[R^{1.84}(F-1) + 1]}} \quad (12)$$

By definition:

$$D_v = D_t F \quad (13)$$

Substitute Equation 13 in Equation 12:

$$L = \frac{R\sqrt{F}}{\sqrt{R^{1.84}(F-1) + 1}} \quad (14)$$

Rearrange by determinants:

$$L^2\left(\frac{1}{1-F}\right) + R^2 - R^2\left(\frac{1}{1-F}\right) = L^2R^{1.84} \quad (15)$$

The last step, converting the form of the equation, was done to facilitate the preparation of the nomograph. The graph has been prepared with abscissa and ordinates as given below:

	x axis	y axis
Change in loading	1	L^2
Change in rate of flow	$R^{1.84}$	R^2
Fraction of friction in valve	0	1/1—T

It will be noted that the scale along the Y axis is labeled "change in loading" and has a range of values from 0.3 to 2.5. If the initial valve loading were 0.5 and increased to a final value of 0.75, the ratio would be 1.5, while if the final loading were 0.25 the change in loading would be 0.5. This scale, then, shows the values of the final loading relative to the initial loading for any change in flow rate.

The diagonal line is graduated to show the changes in flow from the design rate. The mark labeled 1.5 indicates that the final rate is 1.5 times the design flow rate, while the mark labeled 0.8 indicates that the final flow rate is 0.8 of the design flow rate. The values on this scale range from 0.3 to 2.0.

The third scale, pounds along the X axis, is graduated to indicate the fraction of the total friction that has been allotted to the control valve at the design conditions. The range of values extends from 0.1 to 0.8. The scale has been stopped at the value of 0.8 because it rapidly expands as the values increase. Further extension of the scale would make the graduation on the left-hand side too small to be practical. Actually, the graduation 1.0 would be located at infinity. The largest shown value of 0.8 represents the practical limitation of the chart for most commercial applications.

Demonstration of Chart

To demonstrate how the chart is used, we will run through a general description and then take up some specific examples. As a starter, consider the friction in the valve to be 0.7 of the total. Then if the flow rate were increased by 10 per cent the valve loading would increase by 15 per cent. In similar fashion, if the flow rate were decreased, the change in loading would also decrease, but at a faster rate than the flow. As the friction in the valve is decreased by moving to the left on the friction scale, the rate of change of loading for a given change of flow rate becomes rapidly more pronounced. As the amount of friction in the valve is increased, as illustrated by moving to the right on the friction scale, the change in loading more nearly approximates the change in flow. Remember that the point equal to 1.0 on the friction scale lies at infinity. Of course, by definition, parallel lines meet at infinity, and therefore, in the special case when all the friction is concentrated in the valve, the straight-edge would be placed on the chart parallel to the X axis. Note, in this case, that the chart demonstrates that the change in valve loading is exactly equal to the change in flow rate, and that this applies regardless of whether the flow rate is increasing or decreasing from the design conditions. This comment regarding the special case when all the friction is concentrated in the valve has little practical significance. It is presented merely to demonstrate how the chart functions.

Before getting into specific cases, it is well to point out that only true friction losses are to be considered in figuring the fraction of the friction allotted to the valve. If, for example, a pump forces fluid through piping and heat exchangers, through a control valve, and then up the side of a column, the total discharge pressure of the pump will be equal to the difference between the pump suction pressure and the column pressure, plus the heat exchanger and line friction, plus the control valve friction and plus the static head resulting from a change in fluid level. The change in static pressure and fluid head pressure will not alter if the flow rate changes. Therefore, the only values that are considered in the valve-size selection are true friction losses such as those in the heat exchanger, lines, and the control valves.

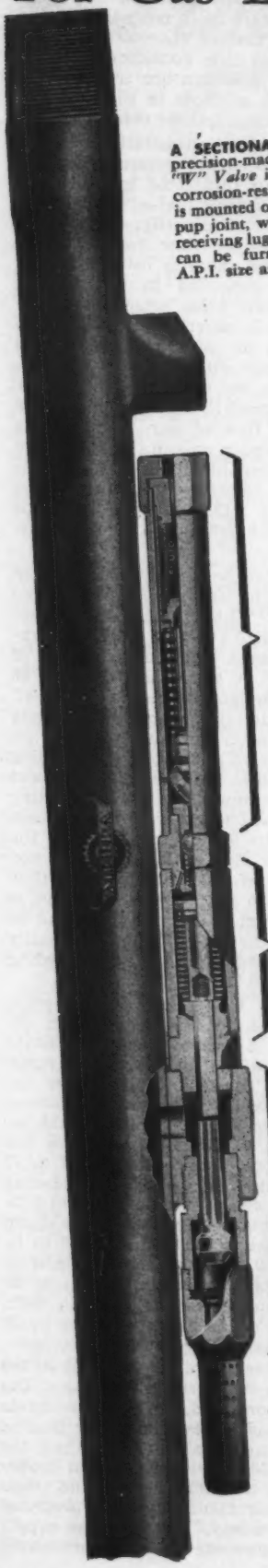
An excellent illustration of the need for adequate pressure drop in the valve is illustrated by the problem of controlling fuel oil to a furnace on a boiler. Ordinarily, a relatively wide range of flow rates will be desired, and there is usually a considerable time lag in the system. Furthermore, a fair amount of pressure drop is absorbed by the nozzle itself. Let us assume this to be 20 lb. The fuel oil flow may be considered to be 100 g.p.h. maximum, with a normal flow of 75 g.p.h., and a minimum flow of, say, 25 g.p.h. The fuel oil header pressure is 45 lb. The upper acceptable limit of loading is 0.95 and the lower limit will be pegged at 0.15. Will the valve be capable of handling the required flow change?

The valve will absorb 56 per cent of the total friction at the design flow rate. With the help of a valve-sizing chart, a size is selected. Suppose it has a maximum capacity of 160 g.p.h. at a pressure drop of 26 lb. The design loading will be 0.47. It was stated that a maximum loading of 0.95 and a minimum of 0.15 are acceptable. The change in loading will be 2.0 at the maximum rate and 0.32 at the minimum. By intersecting 0.56 on the friction scale with 2.0 and 0.32 on the loading change scale the changes in flow rate will be 1.33 and 0.41. Therefore, the maximum flow will be 100 g.p.h. when the valve is operating at the upper limit and 31 g.p.h. at the lower. When it actually was passing 25 g.p.h., the loading would be 0.12.

Suppose the fuel-oil header pressure could be raised to 75 lb. by changing a regulator setting. Would this make the desired flow range possible? The new smaller valve size would pass 140 g.p.h. with a drop of 55 lb. The design loading would be, therefore, 0.54. The friction in the valve would now be increased to 73 per cent. The allowable loading changes would become 1.76 and 0.28. By aligning these values on the chart, the change in flows are found to be 1.44 and 0.33, giving a maximum rate of 108 g.p.h. and a minimum of 25 g.p.h. Thus we can see that the 75-lb. pressure in the header offers a much more flexible system.

Consider a valve controlling the water to an overhead condenser. The type of control is such that a moderate time delay exists. The upper loading limit is considered to be 0.90 and the lower 0.20 because changes in header pressure are anticipated but their magnitude could only be predicted approximately. The average supply header pressure is 35 lb., while the

For Gas Lift Economy in Corrosive Wells



A SECTIONAL ASSEMBLY of three precision-made parts, The *Merla Type "W" Valve* is constructed entirely of corrosion-resistant Monel. Each valve is mounted on the outside of a tubing pup joint, with guard lug above and receiving lug below. Tubing pup joint can be furnished in any standard A.P.I. size and thread.

1. Pilot Assembly *consists of a 3-ply seamless Monel pilot bellows, silver soldered to a Monel filler adapter and a threaded Monel pilot valve stem adapter. The hermetically-sealed bellows, containing fluid with a low coefficient of expansion, withstands high pressure without rupture or distortion.*

2. Power Assembly *consists of another 3-ply Monel bellows, to which is attached a drive bar. When application of gas pressure collapses the bellows, the bar is driven down into contact with the inlet valve in the main valve assembly. A bleed port permits gas pressure to bleed off.*

3. Main Valve Assembly *consists of the inlet valve thimble, inlet valve and inlet strainer cap. It is especially designed to minimize cutting action by gas and sand. The valve stem is triangular in shape; the head has top and bottom seats to give a back check action when reverse fluid flow is encountered. Operation details are fully described in Merla Tool Corp. bulletins. Write for them.*

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design pressure drop for the tube side of the condenser is 15 lb. and 1.0 lb. for the piping. The return header pressure averages 9 lb. The valve design drop is then 10 lb. What variation in design flows will keep the valve within the specified range if the initial loading is 0.45? The lower value of the change in loading will be 0.45 and the upper 0.90/0.45 or 2.0. From the chart it is found that the limiting flow ratios are 0.63 and 1.20.

The chart may be used to determine what per cent of the total friction must be allotted to the valve if the flow changes are known and allowable loading limits have been selected. This process is not as direct as the illustration above because the initial loading must be estimated according to whether the major change in flow will be an increase or a decrease. When a tentative design pressure drop has been worked out, the actual loading of the specific valve as determined for that drop is figured. The actual design loading is found from a manufacturer's chart. This must be tested on the nomograph. Usually, not more than two trials are required.

Explanatory Example

Perhaps an example will help to explain the method. Suppose the flow will probably increase from a normal of 1,000 to 1,250 M.c.f. per day and may fall as low as 400 M.c.f. per day. We want to know what per cent of the total friction must be allotted to the valve. The changes upward and downward are not equal, so a loading of 0.6 is assumed as a starter. Because conditions are not too well known and a little "pad" is desirable, let us assume an upper loading of 0.90 and a lower limit of 0.20. The allowable loading changes will be 1.5 and 0.33. The flow changes are 1.25 and 0.4. The fraction of the total pressure drop required for both the increased and decreased flows is obtained from the chart. The larger figure of the two is the controlling one. Reference to the chart indicates that the friction must be, in this case, at least 65 per cent of the total. A valve-sizing chart reveals that the best valve selection for that particular pressure drop has an initial loading of 0.52 because its maximum flow is 1,923 M.c.f. per day. A final check with the chart reveals that this size will nearly meet the requirements. This points up one consideration, however. The actual design loading cannot be specified ahead of the actual valve-size selection. The loading depends upon the maximum capacity of the specific valve selected and will vary from case to case. Valves are available only in a limited variety of sizes; therefore, one size will be indicated for a range of design flow rates. Because the maximum flow for that one size will be constant at a specific pressure drop and the same size will be indicated for this range of flows, the initial loading for the valve in the several services will vary correspondingly. In the last example an initial loading had to be assumed even though there was no assurance that this exact loading could be attained by a valve of a commercially available size.

When a centrifugal pump is throttled back to a lower flow rate, the discharge pressure increases to a greater or smaller degree. This means that a control valve placed in the discharge piping will be obliged to operate under this condition at a somewhat lower loading than the theoretically anticipated valve. Because the degree of variation depends on many things, this factor cannot be built into the chart for pressure-drop selection. This need not present a handicap if, in the use of the chart, due allowance is made for this condition, when it exists, by narrowing the allowable loading range.

When a centrifugal pump is driven by a constant-speed electric motor, a somewhat more serious problem may be introduced if care is not taken in valve selection. It is common practice, when specifications are written for refinery pumps, to add a pad to both the pressure drop and static head in the system. Frequently the heat-exchanger friction is estimated and is on the "safe side." Line lengths are not known and so the pressure drop is estimated on the high side. Before the valves are actually purchased, a review of actual system friction should be made and the valves sized to absorb the pads as well as the pressure drop originally assigned to them. Too often, a valve that was sized to pass the flow at a pressure drop of 10 lb. is obliged to absorb another 15 lb. of pad, with the result that it may be operating at an inefficient loading. When the pump is turbine driven, the extra pad may be removed by simply reducing turbine speed but when an electric driver is used, the only recourse is trimming the pumps impeller which is a far too costly solution.

Wide Range of Rates

Once in a while in a combination plant, a wide range, of flow rates will be anticipated. This may happen in plants that are essentially batch operated or where two radically different charge stocks are to be used. In such cases the best solution is the use, in critical spots, of two valves in parallel. For a specific operation one valve or the other is shut off. An example comes to mind of a case where, for one operation, the flow was to be 150 g.p.m. while in an alternate operation the rate was only 12 g.p.m. The valve was to be used with a temperature controller and the system was critical. Under such a circumstance the use of two valves was the only answer. Naturally, problems of this type must always be approached from the standpoint of economics considering whether the degree of control required would warrant the extra expense of the two valves.

Finally, how do properly selected valve sizes compare with pipe sizes? This, of course, depends somewhat upon the flow system. There are three bases for line-size determination: economics, limiting velocity, and dissipation of excess pressure. The size relationship of adequately selected valves and piping may be roughly classified as follows:

1. When the valve is in the discharge piping of the pump or compressor, and the only other source of friction is the pipe, the valve, if double ported and air operated, will usually be one size smaller than the line size.

2. When the valve is in the discharge piping of a pump or compressor and heat exchangers contribute to the fixed friction, the valve will ordinarily be one or two sizes smaller than the pipe.

3. When a good deal of excess pressure is being dissipated by the control valve, such as the liquid from a high-pressure separator, the oil from a high-pressure absorber, or high-pressure gas blown down for fuel the pipe and valve-size relationship becomes far more complex. Factors causing this are the possible erosion of the downstream pipe if two phase flow conditions exist or the acoustical velocity limitations in the downstream pipe if the fluid is a gas. Ordinarily, the upstream line size will be one or possibly two sizes greater than valve size. If the fluid is a liquid *that does not vaporize or flash* upon loss of pressure, the downstream pipe size will be the same as the upstream size but if the fluid flashes or is a gas, no generalizations may be made.

In conclusion, the chart introduced in this paper is by no means a cure all for valve-selection troubles. Furthermore, it is based on nothing new or different. Its sole value lies in the fact that, with its use, a complex set of interlocked relations between varying frictions and flows may be seen at a glance. The chart is merely a handy tool to be used in certain valve selections.

Knight Announces Union To Seek Wage Increases

O. A. Knight, president of the Oil Workers International Union, December 15 announced the union's leaders will meet in Fort Worth in January to plan a new drive aimed at increasing workers' wages throughout the oil industry.

Revealing no details of the union's plans, Knight said the industry was making "unparalleled profits" and his C.I.O. membership would demand a share of them.

Specifications V.S. Performance

by
R. J. S. Pigott

for gasoline, fuel oils, and lubricants—

SPECIFICATION of petroleum fuels and lubricants is an extremely elusive matter because the performance of these materials is by no means fully indicated by anything now usually put into a specification.

Table 1 shows the usual data furnished in connection with gasoline, fuel oil, lubricating oil, and grease. For gasoline, about the only items in this list that furnish much information bearing on performance are the distillation curve, which indicates volatility, and the octane number; or the octane number by the two methods, A.S.T.M. and research, will indicate in a rough way about the general behavior. The vapor pressure is also moderately useful as indicating tendency toward trouble with vapor lock. Unfortunately, however, the octane number as normally given is now known not to be a full indication of the behavior of a gasoline in any particular engine. It has now been clear for some time that the variation in makeup of gasoline, that is shape of volatility curve, character of constituents, whether "sensitive" or "insensitive," affects the performance. The tetraethyl lead and sulfur amounts are only very general indications of what a gasoline is going to do because the same amount of lead has a different effect on gasolines of different makeup, and it is not known with certainty what the deleterious effect of sulfur may be.

In lubricating oils the carbon residue, corrosion, pour point, and neutralization number give only very moderate indications of what the performance of an oil will be in an actual engine. For greases, the amount of information that can be furnished by a specification is absurdly low. Melting point and penetration values obtained by penetrometer or consistency measurements are purely relative and do not tie in to any absolute values that can be calculated for anything.

Finally, appearance and odor have a great effect on the customer but may have no meaning whatever in performance. For example, during the war some transmission oils and lubricating greases had a queer dark color. These materials had been proved good by performance tests. In many cases the men handling the oil took a look at the queer colored material, assumed it was no good, and drained it out of the vehicles and put in other material. A good deal of lubricating material was thus wasted. There is no question that the user often thinks in terms of a brand. For example, in the war certain makes of grease and lube oil had proved good in service, and the maintenance section looked for the same make regardless of other brands made under the same Army specification. They were not sure any of the others were as good, because they had no service proof, evidently feeling that the specification was no guarantee of performance.

In order to find out the real value of a fuel in a commercial product, it is necessary to do elaborate road testing or parallel it on specially designed dynamometers which will imitate road test conditions closely. It has been known for some time that the octane value of gasoline varies with speed and different gasoline having the same A.S.T.M. and research octane number, both meeting a given specification, may differ very widely in their low-speed and high-speed octane value.

Volatility can be quite a serious

Aerial view of laboratories of Gulf Research & Development Co. Location is at Harmarville, Pa., 10 miles northeast of Pittsburgh

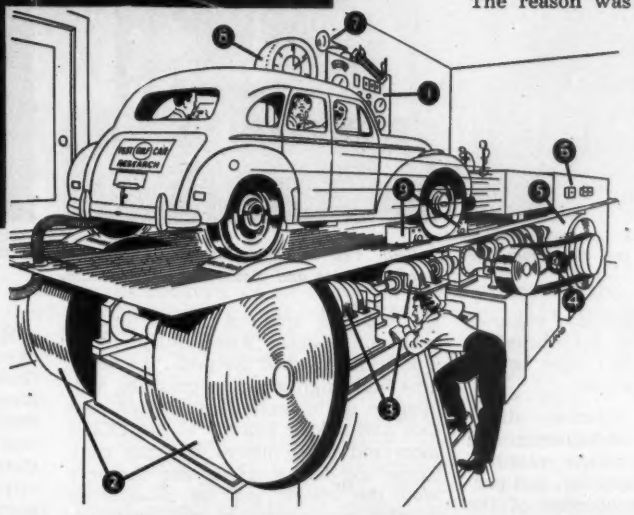


Fig. 1—(Above) Photo of chassis dynamometer, car, and operator. Fig. 2—(Right) Labeled on diagram of the same chassis dynamometer are: 1—Control panel, which includes car speed indicator; air-velocity gage; oil, water, and air temperature and pressure gages; dynamometer and motor controls; 2—Rolls, driven by rear wheels of automobile under test; 3—Rotating weights, selected from panel, to simulate road load of different weight cars; 4—Dynamometer, to absorb power from rolls (to determine horsepower or simulate grades) or rotate rolls at speeds up to 70 m.p.h. (to determine rolling friction, etc.); 5—Blower (part of road load) driven by a belt from roll system, delivering air to the radiator at a velocity equal to the speed of the car; 6—Thermostatic controls for controlling temperature of air delivered to car radiator; 7—Safety siren, activated by movement of rolls if test temperatures and pressures have not been reached, as well as by loss of water, oil, or air pressures; 8—Scale for measuring torque to determine horsepower; 9—Wheel chocks to prevent car from moving off rolls

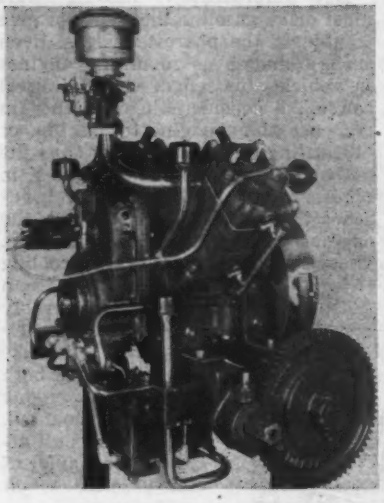
matter because it has become a habit to expect to start a vehicle on a cold winter day and drive off within 10 or 15 seconds and expect to have no trouble with bucking, flat spots, and failure to accelerate properly. The shape of the distillation curve of gasoline and the design of the engine, particularly with regard to manifold heat and manifold layout, are most important in determining how a given fuel will act under these circumstances.

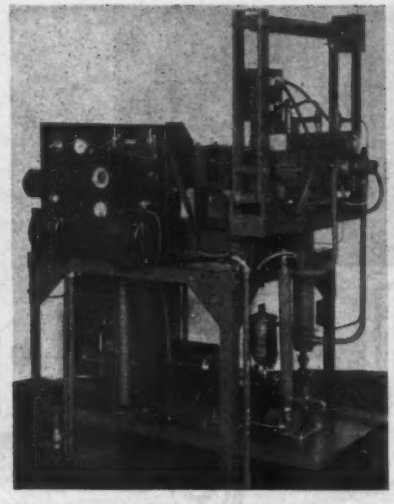
The 10 per cent point in gasoline is most important in obtaining prompt starts; the 50-65 per cent values indicate fairly clearly the length of time for full warmup; and the 90 per cent point affects warmup slightly but indicates more about how much dilution is likely to occur. A further important variable is the engine design, which will give widely variable result on a given gasoline. It is only recently that a test procedure that qualifies the engine as to start and warmup characteristics has been developed. It should be clear that once the gasoline is put together, its distillation curve is substantially fixed and if it is employed in engines sensitive to 10 and 50 per cent point, either through low heat to the manifold or imperfect distribution, this gasoline will always act badly in such an engine whereas it may work very well in the bulk of the engines.

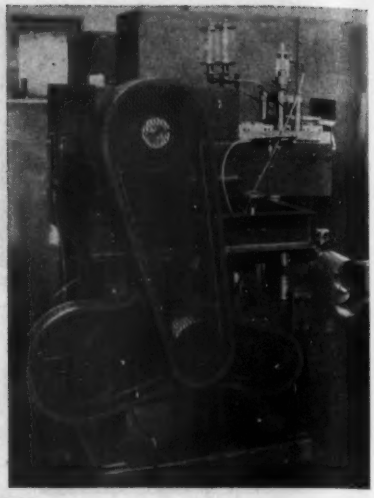
But unfortunately, manufacturers must make gasoline that will not give trouble in the poorest designs. Even such a matter as mounting engines in vehicles (passenger cars or buses) can make considerable difference in response of an engine to gasoline or lubricating oils. In the early days the design of rear-mounted engines in buses brought in a good many headaches that had not existed when the engines were mounted in the front. The reason was chiefly that cooling and ventilation were considerably affected and many steps had to be taken to improve both when the engine was rear mounted. These things all affect the behavior of the gasoline or oil in the engine.

In fuel oils, the viscosity of the oil very definitely affects atomization and many of the nozzles on oil burners are designed so that the viscous effects are high. Most of the nozzles in household oil burners, for example, contain very small-diameter passages close to the final orifice, which are intended to produce swirl in the spray, intended to increase turbulence and mixing. These small passages respond to viscosity as a first power function and consequently affect flow; the orifice itself being more in the nature of a disk orifice, is not appreciably affected by viscosity, but in all cases as viscosity increases the energy that must be put in the spray also increases to get the same fineness

Fig. 3—Test engines in one of the laboratory units of Gulf Research & Development Co.







Closeup views of other test equipment used by Gulf. Fig. 4—(Left) Gulf test engine. Fig. 5—(Center) "Con Rod" machine. Fig. 6—(Right) Cylinder and piston-ring-wear machine

of atomization. The absolute value of these effects cannot be determined at all by specifications but must be obtained by performance test.

Carbon-hydrogen ratios differ noticeably between straightrun and cat cracked fuels; cetane number, diesel index, specific gravity, and perhaps several other properties of the oil have an effect upon the smoke produced in a given burner and boiler. There is, of course, a limit of permissible smoke both because the amount of solid particles affect washing, cleanliness of the house, and the accumulations in the boiler plug the passages and require cleaning out. The only way these effects are presently determinable is by a carefully controlled burner test imitating the actual operation of the burner in service. Here again the design of the burner affects conditions very noticeably because certain types have quite pronouncedly different characteristics. For example, the rotary wall flame burner performs best at fairly high CO_2, 12-13 per cent, and will produce more smoke with larger excesses of air; another type of rotary burner will not operate successfully above 9 per cent. Most of the gun-type burnerns both high and low pressure, will operate quite well up to 9 per cent CO_2 and smoke heavily if the CO_2 is increased much above 10.5 per cent. These are design effects and the only way the effects can be determined so the manufacturer and customer both can be safeguarded against trouble is by performance test.

Importance of Distillation Curve

Distillation curve (volatility) is important for starting. Practically all the household burners on the market now start by electric ignition and conditions must be such that ignition is assured in a relatively few seconds. Again the only way to determine the range of satisfactory CO_2 for a prompt start is by way of actual burner-boiler test; the range in which satisfactory starts are obtained is generally not quite the same as satisfactory range for smoke.

Referring again to Table 1, about the only items that give much infor-

H. J. S. Pigott is chief engineer for Gulf Research & Development Co., Pittsburgh. Pigott was graduated by Columbia University in 1906, and engaged in power-industry installations. For 1 year he was professor of steam engineering at Columbia. From 1915-20 he was consulting power engineer for Remington Arms; superintendent of mills for Bridgeport Brass Co.; works manager of Crosby Steam Gage & Valve Co. In 1922 he was in mechanical engineering for Stevens & Wood, later for Public Service Production Co. From 1929 to date Pigott has been chief engineer in charge of engineering research for Gulf Oil Corp. and its subsidiaries. This paper was presented before the Lubrication Session of the recent A.P.I. annual meeting at Chicago, November 10 under the title, "Buy on Performance and Depend on Brands."

Fig. 7—4,500-lb. bearing dynamometer

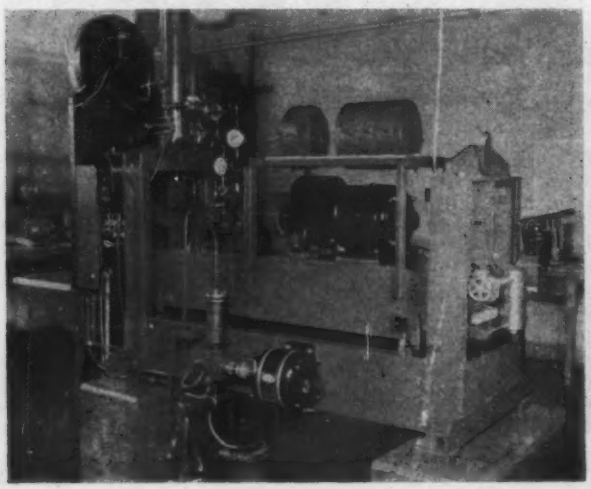
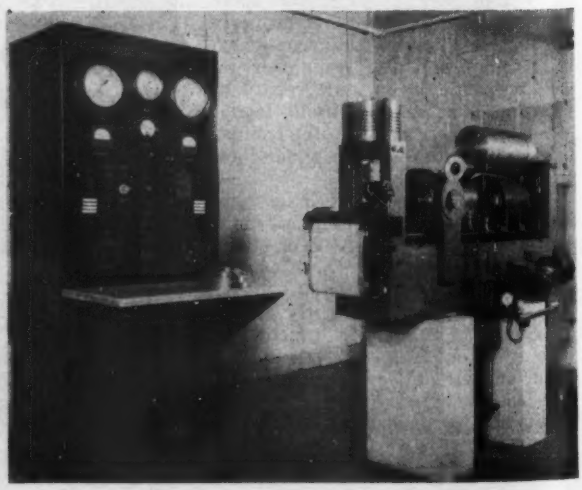


Fig. 8—9,000-lb. bearing dynamometer



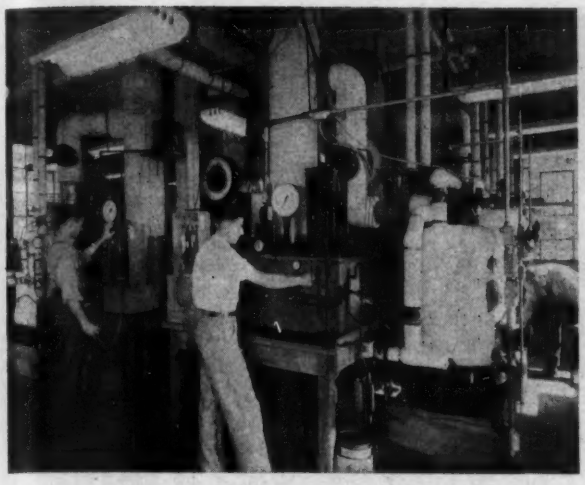


Fig. 9—Portion of Gulf's fuel oil laboratory

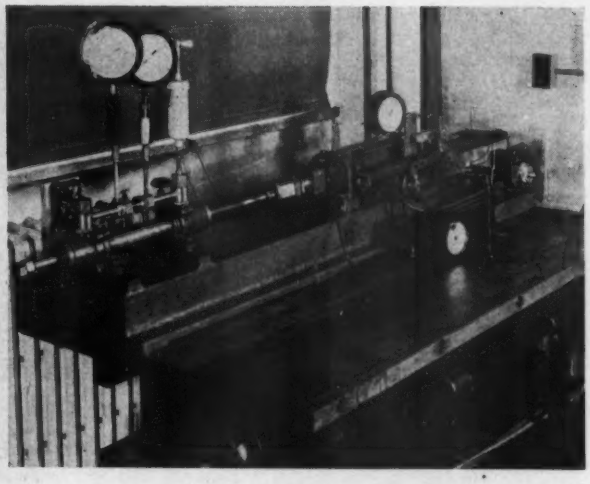


Fig. 10—Grease viscometer

mation as to performance of a fuel oil are carbon residue, copper-strip corrosion, distillation, specific gravity, and viscosity, and none of these give anything but indications of what the performance will be. Performance simply cannot be predicted from them. Again appearance, and in this case also odor, affect the customer appeal, although they have no meaning as regards performance. The stability of the fuel oil may be less with the cracked materials which we know must be used for future, but they need not be, and we are finding out how to make the material as stable in the cracked as in the straightrun form. Curiously enough, reduced stability does not generally affect the burner directly but does give trouble with deposits in storage tanks, piping, screens, and fittings on the way to the burner. Some of the most serious troubles with fuel oil have come from deposits in tanks. Again, elaborate tests for oxidation and other chemical change in storage must be set up to imitate actual service.

Referring again to Table 1, in the case of lubricating oils the only items that give even an indication of performance are about the same as for fuel oil, with viscosity index added. In bearing lubrication we have to know that the oil can stand the loads subsisting in the bearing at its operating temperature, and control corrosion, particularly of those bearing materials known to be sensitive to oxidation acids. We need likewise to know how the oil is going to produce ring belt deposits, knowing already from general experience that certain types of base stock have proved better in diesel engines of the automotive type because they burn off more freely and leave less deposits.

Deposits of lacquer and varnish elsewhere on the engine, as on bearing surfaces, interior of crankcase, piston crown, etc., are important to operation, but very little indication is given by the usual specifications as to the behavior of an oil in this respect. Sludge in the crankcase we know is produced in several ways. There is winter sludge produced by low operating temperatures and water of condensation which does not seem to be affected by properties of the oil to any material extent, but other kinds of sludge are produced by excess of oxidation products which the oil cannot hold in suspension; and the ability of the oil to hold these byproducts in suspension is not indicated in specifications. We may assume that the addition of antioxidants and detergents to an oil will reduce the formation of deposits, but we have no means of knowing how much, without an engine test simulating service.

With regard to greases, Table 1 shows the usual information furnished and of these, only melting point and penetration are of much value in determining what the grease will do. Even these items, particularly penetration or consistency, are purely relative measurements. These measurements show only variation of one grease from another, and guarantee nothing about their performance in an application.

It follows from the foregoing that extensive test equipment either in special test designs arranged to imitate actual operation or field tests in commercial apparatus is essential to determine what the performance of any of these materials is going to be. The results of these tests do not appear in specifications, except in the case of some of the wartime Army specifications in which engine tests were part of the specification. At the present time we can see no way in which elaborate testing of this sort could be included in ordinary commercial specifications, but at least we shall probably find value in qualification tests involving this form of performance testing. However, this kind of testing could not be done on each order but must be done for the whole production of the material. This implies at once the use of a brand as the only practical way of guaranteeing that these materials have been so tested when purchased in small lots.

TABLE 1—SPECIFICATION TESTS

Gasoline—Aniline point, Saybolt color, distillation, specific gravity, A.S.T.M. gum, copper-dish gum, Army gum, Reid vapor pressure, lead, sulfur, octane number.

Fuel oil—Aniline point, ash, b.s. and w., carbon residue, N.P.A. color, copper-strip corrosion, distillation, flash point, closed cup; specific gravity, pour point, sulfur, viscosity, water.

Lubricating oil—Carbon residue, copper-strip corrosion, N.P.A. color, demulsability, emulsability, flash and fire point, open cup; specific gravity, neutralization number, pour point, sulfur, viscosity, viscosity index.

Grease—Melting point, penetration, worked; penetration, unworked; flow point, water, viscosity of oil, soap base, gravity, chemical reaction.

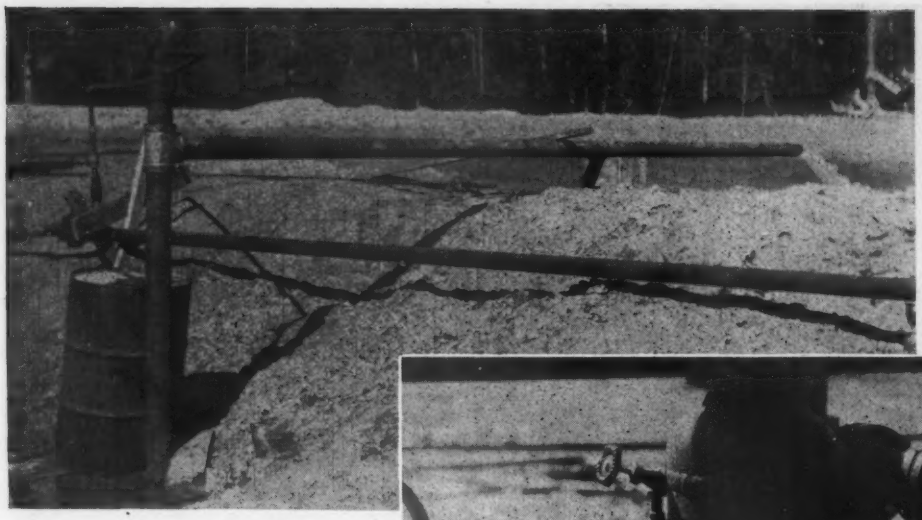
In the laboratory with which the writer is associated, the various units for mechanical tests adds up to a cost of between $300,000 and $400,000 installed, and with the buildings necessary to house the equipment might amount to $1,000,000. This is heavy expense even for a large oil company, but it is absolutely essential in finding out what the products will do in actual service.

None of the results obtained by such test instruments just described are included in specifications, with the exception of government specifications for wartime use, now employed to some extent commercially.

In the case of fuels, it seems that the gasoline produced by any company must serve the bulk of the poorest designs or in the poorest condition, and since octane demand of the engine varies with design, it can be seen that this may work quite a hardship on average production of fuel.

In the case of fuel oil, up to the present time the cracked fuel, which we know must be employed for the future, is generally of higher specific gravity for the same viscosity and has, up to very recently, been some-

(Continued on page 64)



Left: On both land and water operations individual water wells are often drilled to supply water for boiler operations. The water from this particular Superior Oil Co. gas-jet-operated well changed characteristics shortly after drilling operations were begun, necessitating the use of a different treating compound

Right: Treating chemical in powder form is placed in feeder (center) by fireman at specified times and in prescribed quantities

MOBILE LABORATORY moves in on BOILER FEED-WATER TREATMENT

by Ed Short

ONE of the most recent specialized services to be accepted in the field of drilling operations is that of the internal treatment of raw boiler water. That the proper treatment of boiler - feed - water treating plant is not only an important problem, but also one requiring constant engineering supervision, is emphasized by the fact that during the past year close to 50 drilling contractors and operators have turned to the mobile-laboratory method as a means of increasing drilling efficiency.

With a service company under contract to check the water at weekly intervals, and also at any other time when an operator reports difficulty with the water, bad water can be detected before a great deal of harm has been done to the boilers which might later be responsible for down time. Another advantage, brought out by a Louisiana operator, is that the chemical furnished by a service company is already blended when delivered to the well in a 450-lb. drum; so that all the firemen has to do is to measure out the prescribed number of pounds per day and feed it into the boiler. As this contractor put it, the service company offers a tailor-made chemical for a specific water which conforms to the standard treatment recommended for boilers by the A.S.M.E. and American Water Works Association.

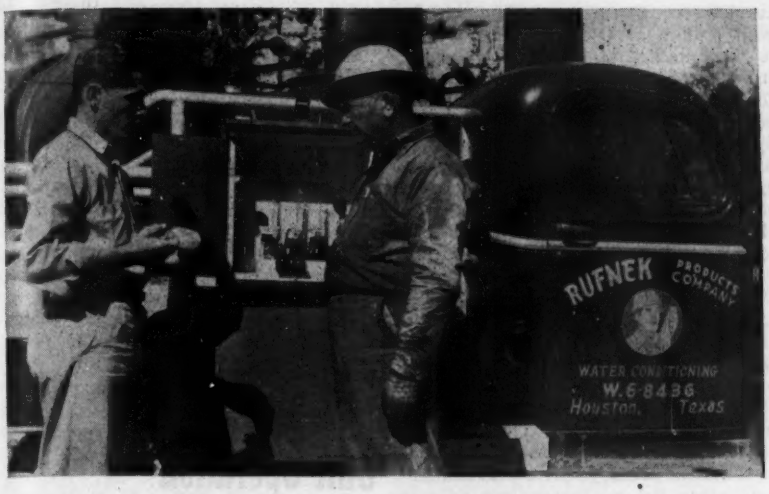
Dangers of Nontreatment

The usual dangers of nontreatment of boiler water vary with water from one locality to another. The brackish waters of the tideland plains area contain a high percentage of salt, and others sodium salt which has a tendency to foam and cause caustic embrittlement.

At the other extreme are the alkaline or high lime "gyp" waters of West Texas, Falfurrias, and Colorado River areas which form dense scale and in many cases are too hard to be successfully treated internally. In between come all types of water found in South Texas, Louisiana, East Texas, and Arkansas. Very often, particularly in West and Southwest Texas, water is not available in sufficient quantities to permit blowing down to remove the sludge which accumulates with treatment.

Some of these jobs require almost daily servicing, because the balance between safe and dangerous operation is so finely drawn. It should be mentioned, also, that sometimes the chemicals which work on a laboratory sample of raw boiler water absolutely refuse to work in the field. This does not necessarily mean that the laboratory analysis and treatment are at fault. More often than not, although the cases are not numerous, it indicates that the fireman is not following instructions as to the amount of chemical to be used over a 24-hour period. Most drilling rigs attempt to use water in boilers which would be unfit for use in stationary steam-gathering plants. However, in the case of such a temporary setup as a drilling rig, the available water has to be used, and operators, in using such water, must arrange for the best internal treatment available.

An example of a sudden change in



Rufnek Products Co. field-laboratory unit on location. Frequent analyses insure good boiler water at all times

water characteristics (from the same source, which in this case was a water well) and the quick change in chemical necessary to prevent trouble, occurred recently at a Superior Oil Co. drilling well in Pinehurst field, Montgomery County, Texas. On October 20 the raw water had a hardness of 6.5 grains, alkalinity 11.2, chlorides 4.8. Boiler water showed zero hardness, 16.6 phenolphthalein alkalinity, methyl orange alkalinity 23.2, and chlorides 8.4; which indicated that it was responding to the designed treatment.

On November 7, only 17 days after the first analysis, a test made at the well by Rufnek Products Co. showed that the boilers were not responding to treatment. A comparison of the raw-water analysis taken on the two dates is shown below:

	October 20		November 7	
	Raw water	Boiler	Raw water	Boiler
Hardness	6.5 gr.	0	10.5	0.6
Phenolphthalein alkalinity	...	16.6	...	2.5
Methyl orange alkalinity	11.2	23.2	10.6	6.8
Chlorides	4.8	8.4	3.5	37.0
pH	...	...	7.2	10.5

At the time the first analysis was made the water well produced an appreciable amount of silica and the designed treatment of blended chemicals was as follows:

Soda	90 lb.
Sodium meta silicate	110 lb.
T. S. P.	235 lb.
Sodium sulfite	8 lb.
	450 lb. (Drum)

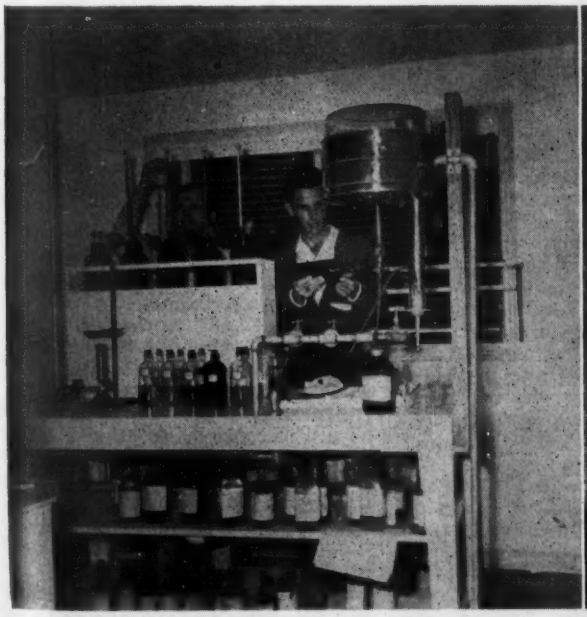
In the meantime the well stopped producing silica, so that the above treatment actually produced a condition it was originally designed to prevent, since it contained silica. The field-laboratory analysis made on November 7 resulted in a specified change to a blended Rufnek treating compound made up as follows:

Soda	190 lb.
Mono sodium phosphate	116 lb.
T. S. P.	110 lb.
Tannins	26 lb.
Sodium sulfite	15 lb.
	450 lb. (Drum)

After this treatment was placed into effect, the boiler water was as follows:

Hardness	0.0
Phenolphthalein	28.4
Methyl orange alkalinity	37.2
Chlorides	37.2
pH	11.8

Another example of the change which might take place in raw boiler water over a short period of time oc-



Left: Main laboratory of Rufnek Products Co., Houston. Raw water received from the field when a new boiler installation is taken over is thoroughly analyzed and treated under field operating conditions in determining design of chemical mix. In picture are Byron C. Bailey, Jr., assistant engineer, and Van W. Ratcliffe, chief engineer. Right: Mixing department where chemicals are blended. According to field men, the fact that chemicals are in mixed powder form when received in field is an advantage; since it eliminates possible error by fireman

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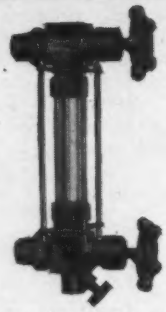

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curred recently in connection with a well drilled at Oyster Bayou where it was necessary to use raw water from rice-field irrigation ditches. At the start, the rice fields were flooded and the water had a hardness of approximately 8 grains, methyl orange alkalinity 12, sodium sulfate 2, and a pH of 7.2. This water was easily treated by Rufnek-designed chemicals. However, the rig was on location 60 days and during that time water was drained from the rice fields and water backed up from a salt-water bayou. Between service calls, in a period of only 1 week, water had changed to 38 grains hardness, methyl orange alkalinity 24, salt 56 grains, sulfates 11, and the pH had dropped to 6.8. The feeding schedule for the first case was 35 lb. of chemical per day. After this change took place, the minimum chemical requirement was 160 lb. per day.

During the 7-day period between service call and boiler washing ½ in. of scale had accumulated on the crown sheets and tubes. The tool pusher was skeptical of the new treatment, but by constant attention and partial external treatment the contractor was able to finish the hole. After the well was completed, 3 days were required to clean the scale out of the boiler—at Rufnek's expense. Inasmuch as the service company fought this rather hopeless condition to the completion of the well, the tool pusher contracted for Rufnek Products Co. to treat three other rigs.

Under some conditions on the Gulf Coast even to the best of treatment by a service company will do very little good toward supplying good boiler water. On a recent drilling operation in the Louisiana Coastal area water for boiler operation had to be barged 25 miles. The raw water was fair and could be treated easily. However, on this particular job, in order to conserve the fresh-water supply, salt water was used on the cooling side of the condensers. After the well had been under way for some time, a different treatment was indicated by the chemical laboratory test; since there was an abnormal increase in the salt content of the boiler water and also a scale-forming hardness. The chemical feed treatment was increased by the field men and fireman until they were putting all the chemical into the boilers which could be handled. Nevertheless the boilers continued to foam, and there was evidence of scale formation. It required 3 days of constant 24-hour service by Rufnek chemists to discover and prove that the condensers were leaking to the extent that treatment of the water was impossible. The evidence was conclusive, however, and the operator shut down drilling operations to dismantle and to repair the condensers.

This same operator awarded the service company another difficult job. At a new drilling location the water was so scarce that the boilers could not be blown down properly. Salt concentration built up to 2,000 grains, which caused an extreme foaming condition in the boilers. While the water could have been more successfully treated the inability to use enough water to blow down threatened the entire drilling operation. However, the little control possible by Rufnek chemists was enough to enable the operator to complete the well. On this job, an antifoaming compound, manufactured by Dow-Corning, was used.

Nation's Largest Unit Operation

(Continued from page 47)

include gas-oil ratios and bottom-hole pressures. A 10-man crew, assisted by the switchers, completed 599 gas-oil-ratio tests in October and finished the rest of the field early in November. Bottom-hole-pressure readings will be taken on approximately 300 wells. Tests are being made on key wells and at least one well in each quarter section, where possible. Pumping wells are not being shut down for tests.

The necessity indicated for a gas-injection program, to get maximum benefits from the field's gas and to increase ultimate recovery, is shown by the accompanying production and gas-oil-ratio curves (see Fig. 1). Reservoir studies have shown that the field, which produces without an adequate natural water drive, originally contained approximately 600 million barrels of oil. Engineers estimate that 140 million barrels of this "oil in place" would have been recovered under competitive methods of operation. Since approximately 69,709,000 bbl. of oil had been produced from the pool by October 1, 1947, (the date unitization became effective), the pool was already 49.8 per cent depleted based on competitive production.

It has been estimated that without unitization, approximately 24 per cent of the total wells in the pool would have been abandoned by 1952, and that by that time all producing wells would have been placed on the pump. By the end of 1957 all wells would have been abandoned. Under unitization, selectivity shutting in of high-gas-oil-ratio wells alone, may extend the producing life to 1959 or later. With a gas-injection program added, the producing life of the field should extend to 1965 or later.

The 32 operating interests, the state, and the estimated 7,000 land and royalty owners should all benefit from the unitization. During the hearings before the Corporation Commission, Don R. Knowlton, consulting engineer, stated that unit operation would

mean an additional $16,000,000 for royalty owners, and an additional $6,800,000 in gross production taxes for the state.

In addition to these three major activities, there are a multitude of details which must be attended to for smooth and efficient operation of the field. The plan of unitization (see digest, Fig. 2) took care of a good many of the details of operation; nevertheless, since the unitization took effect on October 1 a number of questions have arisen.

One matter that required attention was the acquisition of houses and cars for the unit. After canvassing the field and considering the number of employes requiring homes in the field, the unit concluded that all of the lease houses and all of the houses in the various camps would be needed except those in the Stanolind camp in the south end of the field. The unit is recommending the following procedure for arriving at valuations on houses and cars which are being purchased from lessees by the unit:

Houses:

(a) Unit to be billed for book cost less depreciation.

(b) Depreciation to be based on 15-year life.

(c) Adjustment to be made where house is damaged beyond normal wear and tear.

(d) Separate adjustment to be made for fee land, if any.

Automobiles:

To be acquired by unit at book cost less 3 per cent per month, with allowance where justified for trade-in value.

It has been necessary to establish a procedure for paying for oil purchased and for controlling the amount of oil gathered by each purchaser. The Corporation Commission order setting up the unit requires that the sale of the oil and gas produced be distributed considering the common source of supply as a unit. This would mean that each purchaser would have the responsibility of distributing purchase money, first among all the 741 tracts of the unit and then among the persons entitled to share in each tract. To eliminate this involved procedure, a meeting of the field's gatherers and purchasers was held and an alternative plan worked out.

In brief, this plan requires that the unit operator determine the person or persons who are entitled to gather and purchase the oil sold from each tract in the unit. Then, once a month the unit operator notifies each purchaser or gatherer of the total barrels and the total base value of the oil run from the unit during the preceding month, the percentage and amounts which each was entitled to gather or purchase, number of barrels and the total base value actually gathered or purchased by each and the overage or underage in barrels and base value for each purchaser and gatherer. This report shall also indicate the number of barrels of the current month's estimated production which each will be entitled to gather or purchase, and the adjusted number of barrels which each will be entitled to purchase or gather, after making allowance for the overage or underage as of the end of the preceding month.

Immediately upon receipt of the notification from the unit operator, the purchasers pay or bill the unit operator for the difference in base value of the oil actually gathered for the account of each and the base value of the oil each was entitled to have gathered for his account during the preceding month. Also the purchasers compute, in accordance with the percentages of ownership of each interest owner, the number of barrels of the total unit runs by all purchasers allocated to each lease for which he is purchasing the oil and accounting to the interest owners. The purchaser will then deduct taxes and pay interest owners based on barrels and base value allocated to each lease.

Seven wells are presently producing from the West Edmond Hunton lime formation which were not in the unit October 1, as they were completed during the course of the hearing before the Corporation Commission. It was decided by the operating

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committee that these wells should be incorporated into the unit with their participation to be determined by the same formula as was used in establishing the original participation factors. Another problem was presented by four wells in the field which are dually completed in the Bartlesville sand and the Hunton lime. The owners of these wells were authorized to produce the Bartlesville sand for a 120-day period while a solution to the problem is worked out.

In the matter of auditing, the unit operator submitted a manual of accounts containing a proposed account procedure to the operating committee and received approval. Approval was also given to a form for the monthly summary form billing. The operating committee charged its auditing subcommittee with "the responsibility for causing an audit to be made of the operator's unit billing each month, so as to be able to certify to all lessees, within 30 days after issuance by the unit operator of the monthly billing, that the billings are accurate and in conformance with the plans of unitization and the accounting procedure prescribed to the unit operator, or, if there are errors or incorrect charges that appropriate claims have been made."

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Specifications Vs. Performance

(Continued from page 59)

what less stable; it usually requires changes in adjustment of the burners. There has been also, during the early period of use of the cracked materials, more deposits in the tanks and pipes, although these troubles are now largely being eliminated by improvement in manufacture of the fuel oils.

So far as diesel fuel is concerned, the very close clearances used in injectors make them very sensitive to varnish and lacquer deposits and before the cracked fuels can be generally employed for the more severe cases, the stability in this respect must be at least as high as for the former straightrun fuels.

The requirements on a lubricating oil vary greatly with operating conditions. For a bearing that is in the equilibrium condition of perfect film lubrication, the only property of the oil that is important is viscosity, and therefore there would not be much opportunity for differentiating quality of oils if all bearings were run in this condition. The difficulties appear in such cases as starts and stops when imperfect film lubrication occurs, when oiliness and perhaps extreme-pressure effects become of great value. Since every machine must be started and stopped, and in the case of piston rings the same condition occurs in normal running at both ends of the stroke, the lubricants must provide fully for this condition to be satisfactory.

It is true, likewise, that the severity of temperature conditions in an engine varies greatly with design. For example, a hot piston design may produce heavy deposits on the under side of the crown and encourage ring belt deposits. The ring belt itself may vary in severity; tension, character of ring setup, and effectiveness of cooling from piston skirt, or jacketing, come into play. Of the rotating parts in the engine, the wrist pin and connecting rod are usually the severest because they are usually the most highly loaded. The proof of these facts lies in test experience which shows that a particular construction of test engine can be made to imitate other engines by applying heat to various points corresponding to their severe spots.

The sum total of all this situation, however, is that an oil for general use must meet the requirements of all severe spots in all engines. Another design feature that will greatly affect the severity of conditions for an oil in the engine is the lubricating system used to distribute the oil from the pump to the bearings and the bearing grooving itself; these items affect the flow and consequently, since the oil is first a coolant for the rubbing parts of an internal-combustion engine, affect temperatures of operation. Up to very recently little had been done on the subject, and this laboratory apparently took the earliest steps to rationalize the situation.[1] At the present time some bearing manufacturers are undertaking calculations of the same sort and the improvement of engine design ought to be, in this respect, noticeable in the future.

Varnish and sludge deposits elsewhere than in the ring belt will be affected by the severe spots in the engine, and as pointed out, these are apt to be the piston crown, valve chambers, piston skirts, and if jacketing is not perfect, may also appear in connecting rod and main bearings.

Grease lubrication, it must be admitted, is still in a highly empirical state. Not even the best chemist can be sure, after he has laid out a grease, what he will get in performance. Almost without exception the instruments now used for measuring the properties of grease do not give absolute data, only relative data from one grease to another. Recently the writer has pointed out[2] that the use of apparent viscosity of any plastic such as a grease, will permit calculation of performance of a bearing lubricated with this material, much in the same manner that can be done for a true liquid such as an oil. Test equipment is available and in use which gives us experimental information on channeling, feed of grease to bearing, stability, retention, separation, and similar mechanical properties; but with the exception of the instrument described in Reference 2, none of these load the bearing and therefore do not tell how well the lubricant is serving the bearing. An unloaded rolling bearing presents almost no problem in lubrication.

For the protection of the customer as well as for his own protection, the manufacturer must obtain most of the above indicated performance data at quite high expense, both in equipment and labor. The only way in which a manufacturer can guarantee in general to a retail customer that he will get a definite quality of performance when he buys a product is by way of a brand name. The use of a brand fixes the product. The manufacturer has expended a great deal of money to find out in a lubricating oil, for example, how the inhibitor and detergent perform in the worst engines, what the best base oils and method of lubricating will be; all these data must be found and used to get best over-all results. This expensive testing can be performed only for the product as a whole; it cannot be done for each retail purchaser. A change of product involves retesting to avoid a chance of spoiling performance. A manufacturer does not change the makeup of his product without very serious consideration and extensive testing. It therefore appears basic that the reputation of a brand is a most valuable asset to a manufacturer and is practically the only assurance which the customer has that he is getting a product having certain definite performance qualifications.

Until this situation can be changed, it appears desirable that the purchaser should always buy on performance since the specifications tell him so little, and for the present can tell him little more. Therefore, the purchaser should buy on brand, which is the means of guaranteeing performance.

References

1. Engine Design versus Engine Lubrication, by R. J. S. Pigott, S.A.E. Journal, May 1941.

2. Some Test Equipment for Greases, by R. J. S. Pigott. Presented at National Lubricating Grease Institute convention, Chicago, October 17, 1947.

PROGRESS IN METALS

by W. L. Nelson

Consulting Engineer

Quenching Media as Hardeners

SOME simple standard test would be useful for the comparison of the hardening powers of different quenching media. Although there is much to be said for the direct method of hardness measurement on actual quenched specimens, it is uncertain to what extent the results of an experiment on one size specimen of one particular steel are applicable to other steels and other sizes of specimens.

To investigate this matter, five quenching oils and hot and cold water were used, but most work was done with water and one of the oils. The comparisons were made purely on the basis of cooling rate and hardness produced in quenched steels. The other desirable attribute of a quenching medium, that it should not cause quench cracking, was neglected.

Cooling rates were determined at the center of a silver cylinder. No simple correlation was apparent with the cooling rates thus obtained and the hardness found in quenched cylinders of a high-carbon chromium-moblydenum steel. It seems impossible to correlate accurately the hardness with the cooling time over a particular range of temperature for steels such as this one where the transformation temperature varies considerably with the cooling rate. However, the cooling time from 930° to 480° F. gives considerably better correlation of hardness with Jominy bar results than that obtained using the half-temperature time.

Stainless-Steel Cylinders

Further tests were made with stainless-steel cylinders of various diameters. In this case a qualitative agreement was obtained between predictions based on the cooling rates of the stainless steel cylinders and the hardnesses found experimentally in quenched cylinders of hardenable steels.

The results indicate that the usual assumption that the heat-transfer factor H is constant should be regarded with some suspicion. Tests with the silver cylinder showed the value of H as determined experimentally varied considerably with temperature. The effective value of H was also found to depend on specimen size. Where the transformation range of the steel is below 930° F., the tests indicate that the heat transfer at quite low temperatures (570° to 390° F.) is the determining factor for the center cooling rates in the range 930° to 480° F.

Abstract of "Hardening Power of Quenching Media" by Jones & Pumphrey, Iron & Steel Inst. (British) 156, 37 (1947), taken from the October 1947 issue of Materials and Methods.

Some Newer Steels

THE immense amount of research work on the broad range of carbon, alloy, and stainless steels, and on the perfection of metallic and nonmetallic coatings of many kinds has made steel versatile to a degree hardly imagined even 10 years ago.

One of the significant developments of the war was the recognition of the importance of hardenability. This has led to a demand for steels (known as "H" steels) in which the hardenability is restricted to a specified range.

Another development was the use of boron in very minute percentages to increase hardenability. A multipurpose steel, stainless W, combining the high strength and corrosion resistance of standard 18-8 stainless with hardenability obtained through heat treatment, was announced over a year ago. Another new steel is a carbon-molybdenum-chromium composition designed to meet requirements of increasingly high temperatures in the steam lines of power plants and chemical industries. This steel suffers no appreciable loss of creep strength when used at temperatures up to 1,100° F.

Another new material, developed during the war, is electrogalvanized steel. This is excellent for applications where a light galvanized coating is practicable and where good paint finish is wanted.

Enameled Sheet

Enameled sheet is receiving increased use in application for liners for hot-water heaters, refrigerators, washing machines, and the like. The prospects are good that single-coat white enamels may become available not too far in the future. If and when suitable frits are developed, the steel industry will be prepared to furnish suitable steels.

Galvanized sheet and strip is also receiving increased attention. Depending upon the particular sequence of bonderizing, galvanizing, and cold rolling, the fabricator may obtain a bright or dull finish, have superior ductility suitable for deep drawing jobs, and have a surface excellent for paint adherence. The product can be used for such applications as car roofing; barrel and drum stock; and heating, ventilating, and air-conditioning equipment.

Abstract of "New Steels and Their Uses" by Milton Male, Society for Advancement of Management, February 20, 1947, meeting, 10 pp.

Thick Nickel Deposits

THICK electrodeposits of nickel, like hard chromium deposits, are a magnificent industrial tool. These two metals are not competitive but complement each other; each has its own field of use.

Thick nickel deposits are among the most suitable means of building up worn or mismachined parts. Properly deposited, the nickel coating is homogeneous, adherent, and machinable. It can be deposited on bronze, cast iron, and all steels except those with high contents of tungsten or manganese where the adherence is mediocre. Satisfactory deposits can be made even on austenitic steels, high-chromium steels, and monel metal. The hardness of the deposit may be varied from 150 to 450 Brinell by suitable modifications of the plating conditions. The most usual hardness range of commercial application, however, is 200 to 230 Brinell.

These deposits are generally used for resurfacing contacting parts and for imparting resistance to wear and corrosion. Although the nickel does not have the wear resistance of hard chromium deposits, it work hardens rapidly to give a hardness of 280 to 290 Brinell. A large bearing surface, well dimensioned and lubricated, may be resurfaced with nickel if it is used at low or medium speeds.

The nickel plating of surfaces operating in contact with phosphorus bronze, lead bronze, or nickel-cadmium alloys is not advisable. Heavily loaded bearing surfaces used at high speeds should be chromium plated if the amount of wear is less than 0.02 in. on the diameter. If the amount of wear is greater, the parts should first be nickel plated and then chromium plated.

It is impossible to indicate the cost of thick nickel deposits as each operation constitutes a particular case.

An abstract of "Thick Nickel Deposits for Special Surface Protection," by D. Chambaud, Mecanique 30, 285 (December 1946), taken from Materials & Methods of April 1947.

Metallurgical Terms

Topping and Teeming

Topping is the removing of molten metal from a furnace. The pouring of steel from the ladle into molds is called teeming.

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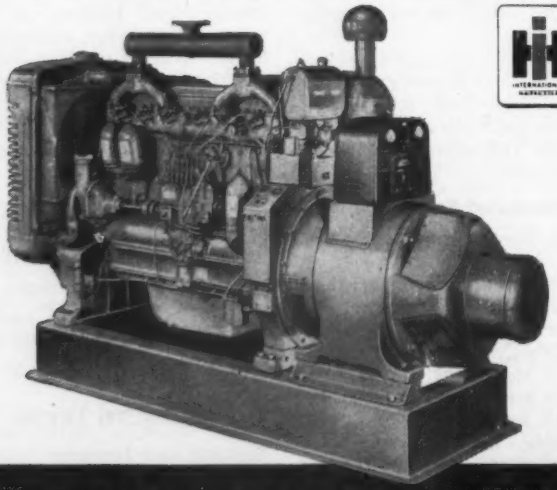

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MODERN Rotary DRILLING

Power Slush Pumps

CAPACITIES of power pumps usually are expressed in the terms of their horsepower rating. The relationship between the required horsepower, pressure, pump size, and speed of operation may be shown by assuming the pump efficiency and changing to the required terms the factor of displacement in the familiar hydraulic horsepower formula. For 85 per cent efficiency the relationship may be then written:

$$HP = \frac{D^2 \times S \times RPM \times P}{107{,}000}$$

where

HP = power requirements
D = fluid cylinder diameter, in.
S = stroke, in.
RPM = revolutions per minute
P = pressure, psi.

No power pumps are as yet available with capacities needed for the extreme depths of present-day drilling. To show the range of different horsepower capacities of power pumps in relation to representative drilling conditions a chart is shown in Fig. 53. In this chart volume and pressure capacities are shown for different size liners and for different strokes and horsepower ratings. The curves represent data of pumps of different makes, belonging to different groups of the selected power ratings. Maximum speed of operation was used in each case.

Group of curves, denoted in the chart as A-A is the same which was used in Installment 48 (in conjunction with presentation of characteristics of steam slush pumps). These curves represent data on some of the many actual field tests conducted by one of the pump manufacturers in cooperation with several operators. Wells covered in the tests ranged in depths from 4,620 to 11,534 ft. A considerable variety of drilling conditions and of equipment was involved in these tests.

It should be emphasized that the characteristics of the pumps, as shown in the chart, are for the maximum speed of operation. These speeds are usually above the recommended speeds of engines and would not be used. Also, the speed of operation of the pump must be considered from the point of view of possible suction difficulties, which may develop particularly in case of heavy and gas-cut muds. It has been suggested that the mean velocity on each piston of 140 ft. per minute be the maximum if such difficulties are to be avoided.[1] For this piston velocity the maximum speed of operation would be:

$$\text{Max. RPM} = \frac{840}{\text{stroke in inches.}}$$

Assumption of such a mean piston velocity also furnishes a convenient means of comparing the capacities of different pumps.

From the above considerations it is apparent that the actual ratings of the pumps will be smaller than those shown in the chart. Even with these decreased ratings the capacities would be sufficient for the presented test data. However, the largest available capacity would have to be used for some of the wells represented by the tests, and not much margin would be left for further increase in volume and pressure requirements. Considerable development work is being done on the matter of further increase of power slush pump capacities. The work includes a number of difficult problems, one of which is the weight of the still larger pumps. The extent of the problem may be appreciated if the pump capacities needed for the deepest wells now drilled, or to be drilled in the future, are considered in relation to the data shown in the chart. The Pacific Coast District Topical Committee on Drilling Practice of the American Petroleum Institute states that for normal drilling of 15,000-ft. or deeper wells 900 hydraulic horsepower, 3,000-psi. pressure, and volume of not less than 500 g.p.m. will be required.

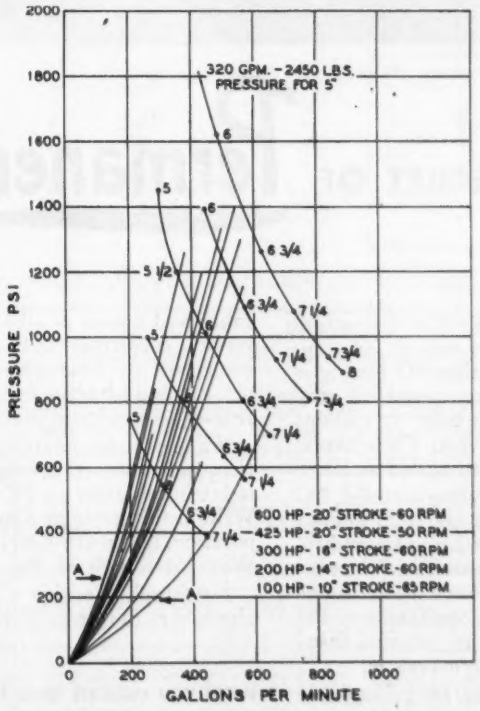
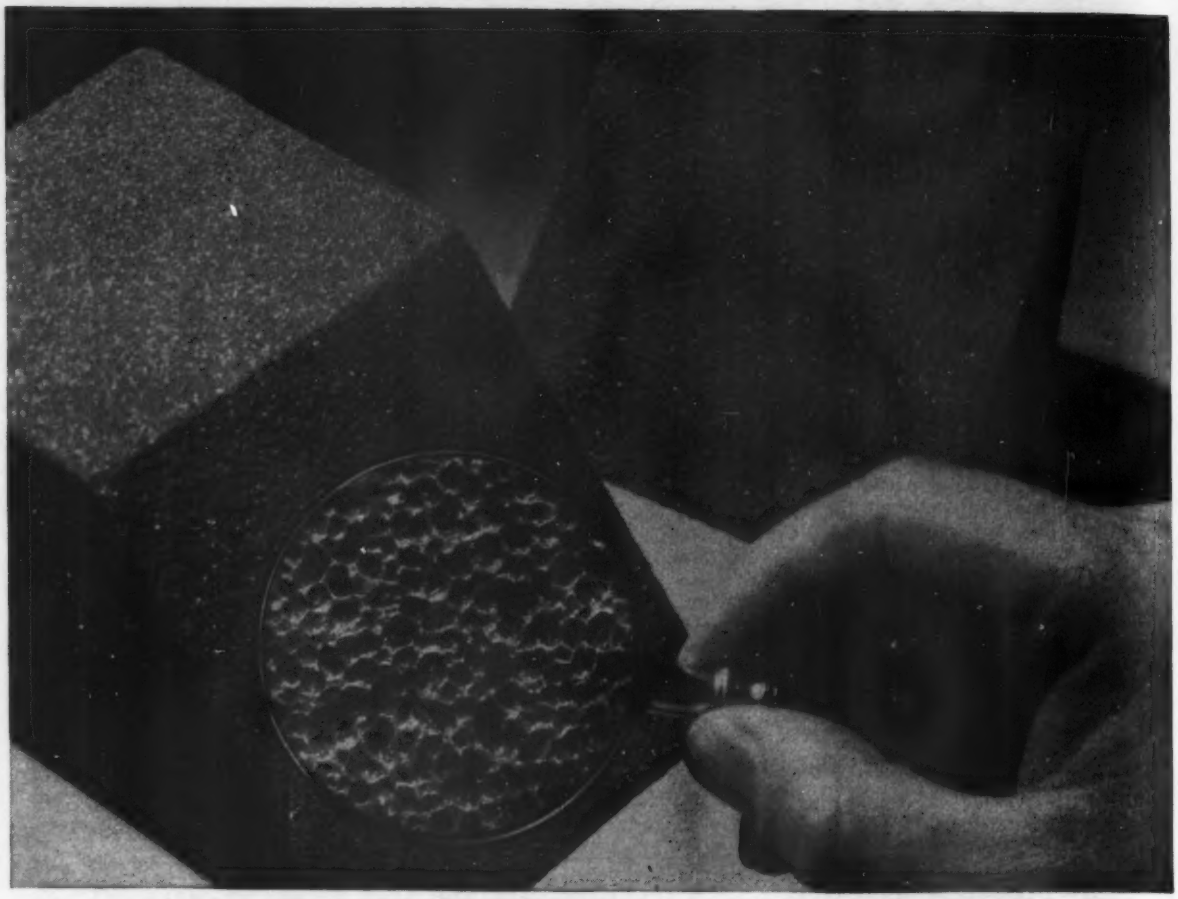


Fig. 53—Characteristics of different power slush pumps at maximum speed of operation, and their relation to volume and pressure requirements of a representative group of field tests

Reference

1. W. S. Crake: Modern Rotary Drilling Machinery and Practices," The Oil and Gas Journal, July 28, 1945.

No. 49 in a series by Joseph Zaba, petroleum engineer, Houston



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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Cost of Leaks

LEAKS are obviously expensive even if the lost material can be reclaimed; of course air, steam or water that is lost by a leak can seldom be recovered. Table 1, taken from Cobb & Wall, The Oil and Gas Journal, March 30, 1939, page 104, indicates the magnitude of utility leaks and Table 2 shows similar information on oil.

Losses of gaseous materials are not easily located. Table 3 indicates the noise and flame size obtained in a few experiments. Faulty fittings or connections were exposed to bottle gas at a pressure of only 6 oz. In addition to the tests tabulated in Table 3, several connections that were in good condition were tested and it was found that the good joints were usually gas tight even when only tightened by hand.

The tests of Table 3 indicated in general that a noisy leak is not necessarily a large one. At higher pressures than 6 oz., large leaks would undoubtedly make noise.

TABLE 2—LOSSES BY OIL LEAKS

Rate—	Loss in 1 day: Amount (gal.)	Loss in 1 day: Value*	Loss in 1 month: Amount (bbl.)	Loss in 1 month: Value*	Loss in 1 year: Amount (bbl.)	Loss in 1 year: Value*
One drop per second	1⅛	$0.05	0.8	$1.62	10	$20
Two drops per second	3¾	0.18	2½	5.00	30	60
Drops breaking into a stream	24	1.14	17	34.00	204	408
⅛-in. stream	260	12.38	186	372.00	2,232	4,464
7/32-in. stream	10	20.00	309	618.00	3,708	7,416
¼-in. stream	22	44.00	669	1,338.00	8,028	16,056

*At $2 per barrel.

TABLE 3—AUDIBILITY OF LEAKS FROM FAULTY FITTINGS

Connections—	Test No.	Leak, cu. ft. per hour	Audibility (ft.)	Flame length (in.)
Loose ½-in. cap and collar	1	0.750	6	
Same, but tightened	2	0.718	6	2
Same, but tightened with long wrench	3	0.068	None	None
½-in. nipple and cap (loose)	4	1.760	10	10
Same, but tightened strongly	5	1.136	7	7
½-in. collar and 45° elbow (loose)	6	2.400	6	*8
Same, but tightened strongly	7	0.628	4	†4
Split ½-in. elbow	8	Large	None	
Flattened nipple and cap	9	1.460	6.5	‡5

*8-in. flame on collar, 1-in. flame on ell. †4-in. flame on collar, 1-in. flame on ell. ‡Three 5-in. flames.

PIPE AND TUBING SIZES

So many sizes and varieties of pipe, tubing, casing, and other similar items are available that their dimensions, etc., cannot be presented in The Refiner's Notebook. However, the outside diameters and inside diameters or wall thicknesses of the most important commercial types are being tabulated in the following issues of the Notebook:

No. 173, Dec. 6, References and Specifications
No. 168, Nov. 1, Sizes up to 2 in.
No. 169, Nov. 8, Sizes from 2 to 4 in.
No. 170, Nov. 15, Sizes from 4½ to 5¼ in.
No. 172, Nov. 29, Sizes from 5½ to 6 in
No. 174, Dec. 13, Sizes from 6⅝ to 7 in.
No. 175, Dec. 20, Sizes from 7⅞ to 8⅝ in.
No. 178, Jan. 10, Sizes from 9 to 10¾ in.
No. 179, Jan. 17, Sizes from 11 to 13 in.
No. 181, Jan. 31, Sizes from 13⅜ to 20 in.
No. 182, Feb. 7, Sizes from 22 to 60 in.

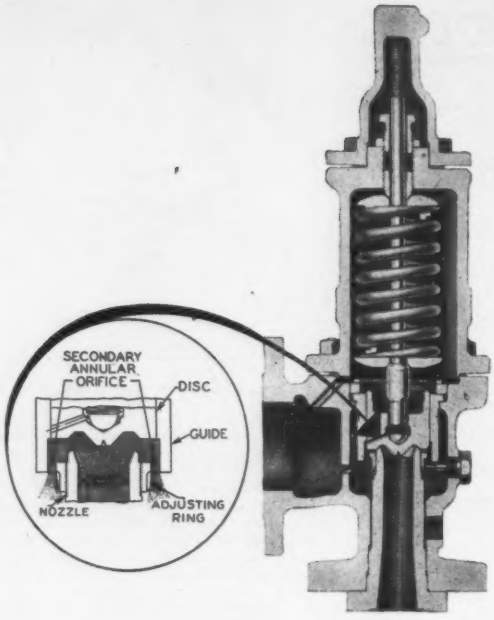
In addition the following Notebooks on exchanger tubing were published in 1946:

No. 86, Mar. 23, Exchanger Tube Materials
No. 87, Apr. 6, Standard Exchanger Tubing
No. 123, Dec. 14, Weight of Steel Tubing

TABLE 1—LOSSES OF AIR, STEAM, WATER, AND FUEL GAS THROUGH 1/32 TO ½-IN. DIAMETER HOLES

SIZE of OPENING	AIR 100 lbs. Pressure: Number of Cu. Ft. Wasted Per Month	AIR: Cost Per Month @ 5¢ per M. Cu. Ft.	STEAM 140 lbs. Pressure: Number of Lbs. Wasted Per Month	STEAM: Cost Per Month @ 25¢ per M. Lbs.	WATER 40 lbs. Pressure: Number of Gallons Wasted Per Month	WATER: Cost Per Month @ 3¢ per M. Gal.	FUEL GAS 20 lbs. Pressure: Number of Cu. Ft. Wasted Per Month	FUEL GAS: Cost Per Month @ 12¢ per M. Cu. Ft.
½"	17,798,400	$ 889.92	1,085,000	$ 271.25	1,231,000	$ 36.93	5,420,000	$ 650.40
⅜"	9,979,200	498.96	620,000	155.00	692,400	20.77	3,040,000	364.80
¼"	4,449,600	222.48	274,000	68.50	307,700	9.23	1,357,000	162.84
⅛"	1,114,560	55.78	68,000	22.00	76,900	2.31	339,000	40.68
1/16"	278,640	13.93	17,200	4.30	19,200	0.58	84,600	10.15
1/32"	69,552	3.48	4,280	1.07	4,800	0.15	21,200	2.54

No. 177 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa



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ENGINEERING *fundamentals*

Permeability—Darcy's Law

ONE of the necessary characteristics of a petroleum reservoir is its ability to allow the flow of fluids through it. The quantitative expression of this characteristic is of basic importance in the production of oil. This property of a reservoir rock is given the name of permeability.

The quantitative expression of permeability is known as Darcy's law, so named after its discoverer, a Frenchman, Henry Darcy. Darcy's experiments were made with water flowing through horizontal sand-filter beds and resulted in his formulation that the rate of flow through a sand bed was proportional to the pressure head above the filter and the cross-sectional area of the filter, but inversely, proportional to the thickness of the filter. This law has since been extended to apply generally to any fluid flowing in any direction through a porous material so long as conditions of flow are viscous.

The formulation given by Darcy is an integrated equation applying to the specific system he studied. The general formulation of his law is usually made in a differential form, thus:

$$v = -\frac{k}{\mu}\frac{dp}{dl} \qquad (1)$$

where

v = macroscopic velocity of flow, in centimeters per second.

μ = viscosity of the fluid that is flowing, in centipoises.

k = permeability constant, in darcys.

$\frac{dp}{dl}$ = pressure gradient in the direction of flow, in atmospheres per centimeter.

In writing this equation, it must be noted that several conditions are necessary. First, it is assumed that the entire pore space of the reservoir material is filled with the fluid flowing and only with that fluid. Second, the velocity of flow, v, is not an actual but an apparent velocity. It is equivalent to Q/A where Q is the volume rate of flow in cubic centimeters per second through the cross-sectional area A. The area A is expressed in square centimeters perpendicular to the direction of flow at the point where v is desired. Since flow occurs only through the pore area and not the entire area A, the apparent velocity v is smaller than the actual fluid velocity.

A permeability of one darcy may, therefore, be defined as that permeability which will allow the flow of 1 cc. per second of fluid of 1 cp. viscosity through an area of 1 sq. cm. under a pressure gradient of 1 atm. per centimeter. Units other than those indicated may be used if desired. Those given are such to produce k in darcys, the commonly accepted unit. *A millidarcy is one-thousandth of a darcy.*

To express the quantity of fluid that will flow through a given reservoir system of specified geometry and dimensions, it is necessary to integrate the differential Equation 1 given above, over the boundaries of the system desired. Natural reservoir systems do not ordinarily conform to any simple geometrical form. Nor are we able to produce from reservoirs so that a simple geometry is inherent. Usually, therefore, the application of Darcy's law to a reservoir system must be in the nature of a simplification. Two ideal systems are used as being most widely adaptable to producing systems. These are the linear flow system and the radial flow system.

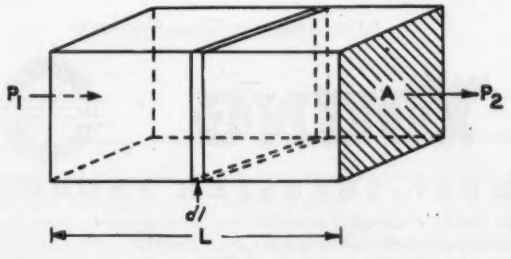


Fig. 1—Typical linear flow system

In the linear system, it is assumed that flow occurs through a constant cross-sectional area, that the ends of the system are parallel planes, and that the pressures at either end of the system are constant over the end surface. A typical representation of this is given in the accompanying figure.

It will aid in the understanding of permeability and fluid flow if the equations holding for this system are developed. Darcy's law for a dl segment of this system is:

$$\frac{Q}{A} = -\frac{k}{\mu}\frac{dp}{dl}$$

If a noncompressible fluid is flowing, all of the quantities are constant and the integration can be performed directly, thus:

$$\frac{Q}{A}\int_0^L dl = -\frac{k}{\mu}\int_{P_1}^{P_2} dp$$

which results in:

$$Q = \frac{kA\,(P_1 - P_2)}{\mu L} \qquad (2)$$

If a compressible fluid is flowing, the quantity Q varies with the pressure change. The usually assumed variation is that PQ = constant = $P_m Q_m$ where $P_m = \frac{P_1 + P_2}{2}$ and Q_m is the rate at P_m. The integration is, therefore:

$$\int_0^L dl = \frac{-kA}{P_m Q_m}\int_{P_1}^{P_2} P\,dp$$

$$Q_m = \frac{kA\,(P_1 - P_2)}{\mu L} \qquad (3)$$

Thus, it is evident for the linear system that gas flow and liquid flow can be calculated by the same equation provided the rate is measured at the pressure of the system. These equations are the ones most commonly used for the determination of permeability in the laboratory.

New nomenclature:

μ = viscosity of fluid flowing

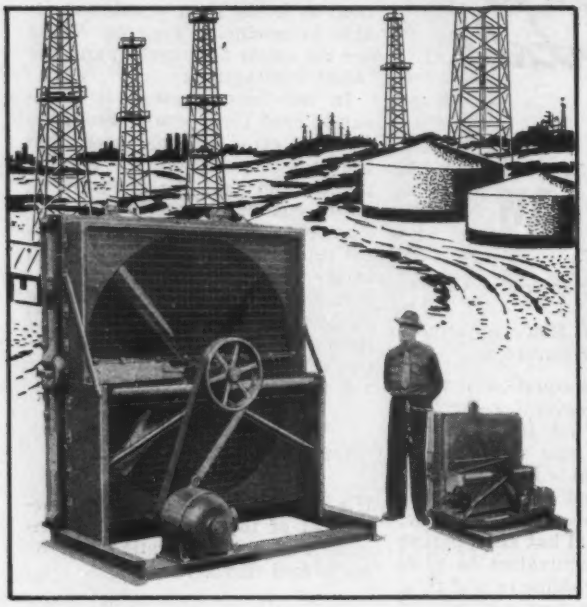
k = permeability

P_m = arithmetic mean pressure of flow

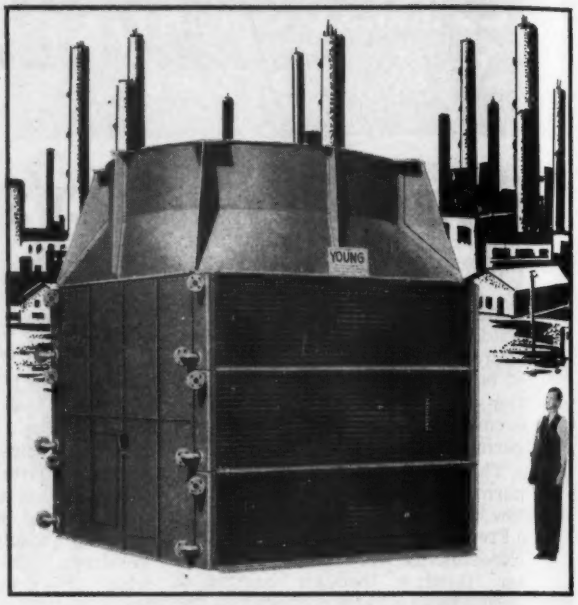
Q_m = volume rate of flow measured at P_m

Series prepared by Dr. John C. Calhoun, Jr., Petroleum Engineering School, University of Oklahoma

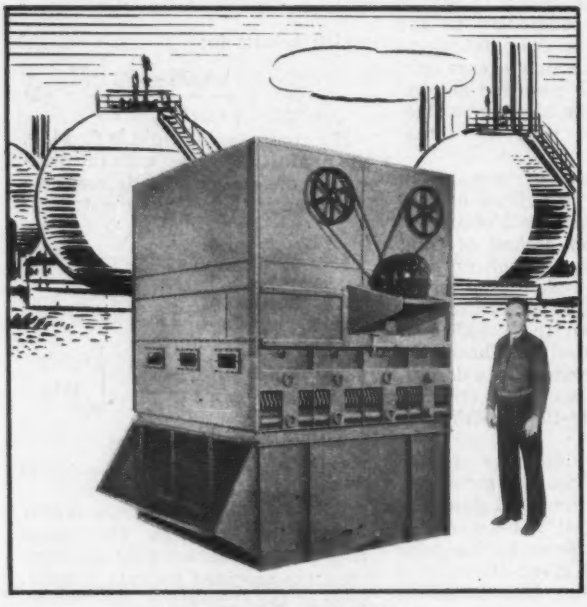
FOUR FAVORITES FOR COOLING
from Well to Refinery



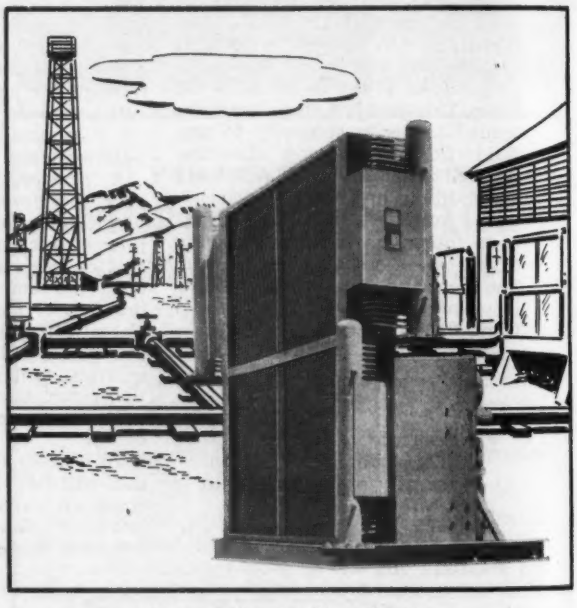
Jacket Water Coolers



Vertical Air Discharge Coolers



Evaporative Coolers



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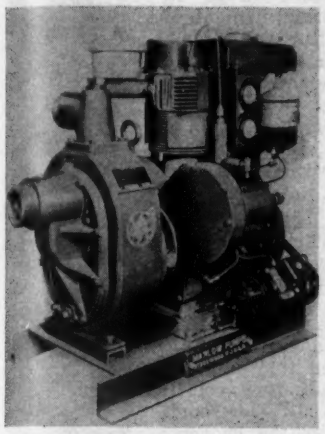
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

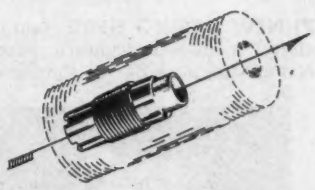
by John M. Spears



(1) SMALL PUMPING UNIT uses diesel power. This 220-g.p.m. self-priming centrifugal pump is used where the storage and handling of gasoline is hazardous, where continuous operations make fuel economy important, or in foreign countries where cost of gasoline is prohibitive. Unit is powered by small Sheppard engine rated at 3½ continuous horsepower at 1,800 r.p.m. It is single cylinder, air cooled. One gallon of domestic fuel oil will pump 36,500 gal. of water. Unit is equipped with electric starting. Full pressure lubrication is used. *Marlow Pumps.*

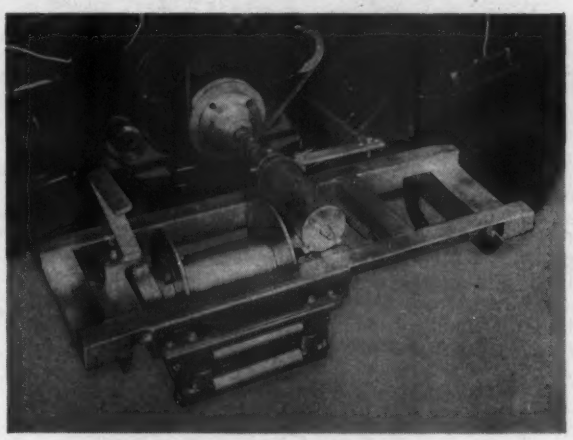
IT'S NEW CHECK IT

(2) NEW OIL-WELL CHOKE has a hermetically bonded "fused Zirconium Oxide" ceramic liner. Abrasive action of sand and corrosive action of salt and acids have little effect on the hard interior surface of liner. The bonding withstands pressures up to 125,000 psi. Manufactured in 22 sizes ranging from 3/64 to ½ in. Adapter bushings are also available, custom made to fit any type of nipple. *Texas Product Manufacturing Co.*



IT'S NEW CHECK IT

(3) ALUMINUM FRONT-END WINCH, for pulling light vehicles out of deep mud or over rough terrain, prevents costly and time-consuming delays to geophysical, pipe-line, and other types of field crews. Winch is driven from the front end of the auto crankshaft by an enclosed, self-aligning, jaw-type clutch—and no power takeoff is required. Clutch is easy to install, and cannot be assembled out of line, or get out of line after installation. New-type clutch permits quick and easy changing



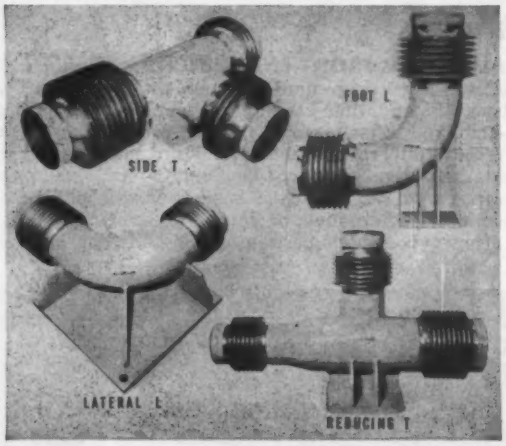
of fan belts without disassembling clutch. As jaws are precision made and run in grease, clutch is easily engaged with the engine idling, and may be easily disengaged at any time, even under a load. No sand, mud, or water can enter the sealed clutch housing, and the clutch is operated from the driver's seat. Winches are furnished with special mounting frames to fit each of the more popular light vehicles, making field installation simple and easy. All units are furnished with clutch assembly, inside cab control, and all-steel four-way cable roller. Winch mounts inside the grill in front of the radiator on gassenger cars and pickups. *Ramsey Winch Manufacturing Co.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

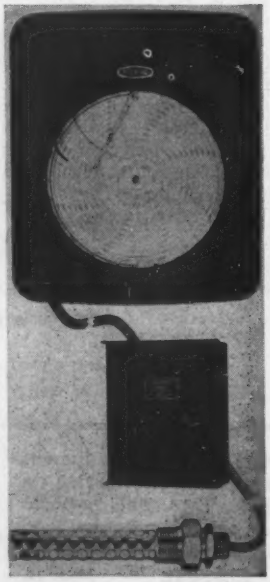
(4) NEW EXPANSION FITTINGS supplement regular Magnilastic expansion joints which are made for a full range of pressures from 30 in. of vacuum to 1,000 psi. in pipe sizes from ½ to 72-in. New line of anchor-base



expansion-joint pipe fittings are of stainless-steel construction. Note in the Side "T" how number of bellows flanges may be varied to accommodate unequal expansion in each leg. Expansion fittings solve many piping-layout problems of limited space and multiexpansions. Installation costs and time are saved by the minimum amount of welding required. Pipes need only be led to the fitting point and joined to proper unit. *Magnilastics Division, Cook Electric Co.*

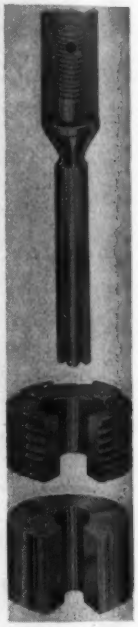
IT'S NEW CHECK IT

(5) DEW POINT RECORDERS and recording controllers are simple, continuous dew-point-measuring instruments. Unique feature of the equipment is measuring element, the Dewcel. It has the general appearance of a perforated metal cylinder about 9 in. long and 2 in. in diameter. Within is a central tube containing the thermal bulb, wrapped with a saline-saturated woven-glass tape and two windings of silver wire, to conduct the heating current. Moisture determination by the Dewcel is based on the fact that for every water vapor pressure in contact with a saturated salt solution there is an equilibrium temperature at which the solution neither absorbs nor give up moisture to the atmosphere. Function of variable heat supply is to bring the Dewcel to this equilibrium temperature. This temperature, measured by the thermal bulb, is transmitted to the recording instrument, and is read on the chart in degrees of dew-point temperature. Recording is continuous. Various standard chart ranges are available. Two types of recorders are offered. One is the Dynalog all-electronic instrument; the other is the liquid-filled system type. *Foxboro Co.*



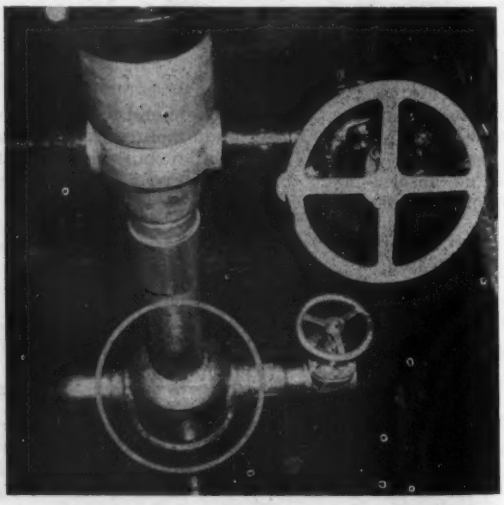
IT'S NEW CHECK IT

(6) MICROFLO CONTROL VALVE with spline plug can handle flows in cubic centimeters with pressure drops in thousands of pounds. Basic element of the valve is a solid stellite valve plug, which is honed to fit in a solid stellite seat. Physically the flow control section of a spline plug is ¼ in. o.d. by 1⅝ in. long. It is a selective lapped fit in a ⅝-in. deep seat. This seat depth insures streamline or viscous flow just as the plug is leaving the seat. Flow control in the 1 in. of valve travel is governed by the shape of slots or grooves milled into the plug surface. Valves can be provided in any body size of ½, ¾ or 1 in. Actual size of valves is below 3/16 in. normal rating. There are 15 interchangeable valve plugs for seats numbered 1 through 15, corresponding to a valve flow coefficient (C_v)—or 0.63 to 0.001. Flow coefficient (C_v) is defined as the capacity of the valve in gallons per minute of water at 1 lb. pressure drop. Flow characteristics of No. 1 through No. 5 are equal percentage, No. 6 through No. 15 linear. *Hammel-Dahl Co.*



IT'S NEW CHECK IT

(7) NEW CASING HEAD features strength plus simplicity. All-metal structure assures permanent well protection—no packing to tighten or deteriorate. Head is

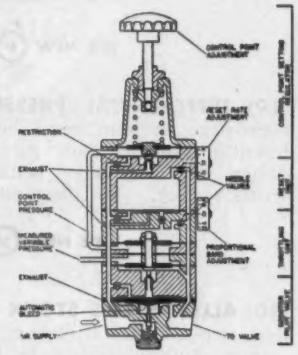


in one piece and there is no gas seepage to cause corrosion. All joints are external for ready inspection. Casing head will stand any pressure that casing is capable of holding. Casing is supported by weld—no limi-

tation on length of casing string. Any type of tubing head may be used. Installation procedure is simple and requires little time. (Patent pending). *Field Service Co.*

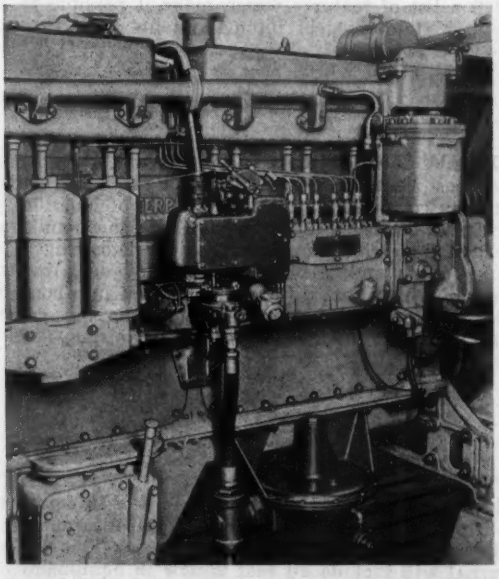
IT'S NEW CHECK IT

(8) NULLMATIC CONTROLLER operates on pneumatic force-balance system, without use of levers and linkages. Automatic control instrument is for temperature, pressure, flow, liquid level, specific gravity, and all control applications in which pneumatic transmitters can be used as primary elements. Controller operates directly from the process transmitter, and sends an output pressure to control valve without introducing frictional errors, with their resulting dead-spot and controller lag. Control action is completely independent of the operation of indicator or recorder, because these units are outside the control circuit. All components have been combined in a "stack" of interchangeable parts and diaphragms without complicated external piping. Control point setting is an air-pressure loading, a feature which completely eliminates mechanical linkages, and permits accurate adjustment. If remote control-point setting is required, top section is eliminated, second section is modified slightly, and a separate regulator is located at the desired control station. Calibrated gages are furnished to show control-point setting, process measurement, valve pressure, and supply pressure. *Moore Products Co.*



IT'S NEW CHECK IT

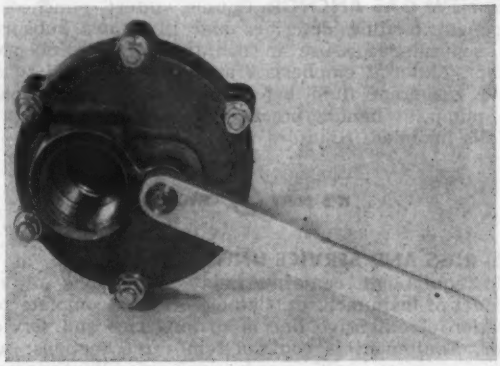
(9) DUAL-FUEL ATTACHMENT, for service with diesel engines is used in, or near, gas-producing areas where pipe-line gas can usually be obtained at low cost. The



ease with which conversion is made makes it practical to use the cheapest fuel as the situation permits. Attachment consists of special precombustion chambers, modified fuel-injection pumps for precise metering of minute quantities of diesel fuel, a special governor control assembly for interconnected fuel-injection pump and gas-throttle valve, and the necessary gas lines and pressure regulators. With attachment installed, engine is started on diesel fuel alone and a single manually operated control lever is used to switch over to natural-gas operation with pilot diesel-fuel ignition. Governor-controlled gas-throttle valve regulates quantity of natural gas drawn into engine cylinder and the modified fuel-injection pumps meter the diesel fuel, timed for positive ignition of the high-temperature, high-pressure air-gas mixture. parts of attachment illustrated include incoming natural-gas piping, pressure regulator, and special governor and dual-fuel injection pump group. *Caterpillar Tractor Co.*

IT'S NEW CHECK IT

(10) NEW SHUTOFF VALVE has quick-opening operation, leakproof characteristics, and heavy-duty all-steel construction. Although valve is designed for butane and other similar services, unit is also available for water or corrosive service with a heavy cast-bronze body. Valve illustrated fits 2-in. pipe size with a straight-



through opening of 1¼-in. diameter. Only 18-lb. force is required at end of handle to operate at 200 psi. It employs "Shear-Seal" principle which provides a metal-to-metal seal that is self aligning and automatically compensates for wear. Not critical to dirt because foreign materials are wiped away instead of lodging between the sealing surfaces. Valve has only one basic part and requires no lubrication or packing adjustment throughout its life. *Saval Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

(11) STRATUBE SECTIONS. Types and sizes, design features, and construction details are described and illustrated in new 14-page 2-color bulletin. Applications and advantages are given for both horizontal and vertical, and high-pressure and low-pressure types. Plant photographs included. *Joseph A. Coy Co., Inc.*

IT'S NEW CHECK IT

(12) LIQUID-SEAL LIFTER ROOF. Method of determining which of the flat-bottom tanks in a vapor-saving system to equip with a lifter roof and the method of computing the correct sizes of vapor lines connecting the tanks are described in new 12-page booklet. Vapor pressure of the stored product, the expansion of the air-vapor mixture and the flow of vapor in the vapor lines can be read directly from the chart and tables included. *Chicago Bridge & Iron Co.*

IT'S NEW CHECK IT

(13) HOW TO TEACH FIRE FIGHTING. A 15-page demonstration booklet gives complete information on fire fighting. Headings include: Handling the demonstration, rules which apply to any demonstration what fire is; extinguishing the fire, classifications of fires and description of principal types of extinguishers. *Walter Kidde & Co.*

IT'S NEW CHECK IT

(14) OIL-FIELD ENGINES. New 16-page bulletin contains latest specifications and technical data on all of manufacturer's oil-field-model diesel engines. Power curves and installation dimensions included. Illustrated. *Detroit Diesel Engine Division, General Motors Corp.*

IT'S NEW CHECK IT

(15) NEW GAS ANCHOR. Catalog insert punched for loose-leaf binding describes and illustrates subsurface gas separator for use in conjunction with deep-well pumps. Material emphasizes anchor is designed to separate gas from fluid before entering pump, allowing the pump to handle practically dead fluid. Operating details included. *Bradford Motor Works.*

IT'S NEW CHECK IT

(16) RIGS AND SERVICE UNITS. New catalog of oil-field equipment contains field photographs of each product of manufacturer. Catalog offers a complete presentation of extensive line of drilling rigs and servicing units. Equipment is contained in three sections: well-servicing units, drilling units, and miscellaneous products. *Franks Manufacturing Corp.*

IT'S NEW CHECK IT

(17) GASKET AND SEALING MATERIALS. New 20-page booklet provides data needed to make a choice of resilient gasket material. Information is given on cork compositions, cork-and-rubber compositions, synthetic-rubber compounds, fiber-sheet packings, and factors in the choice and use of sealing materials. Two-page spread gives chart of gasket recommendations. *Armstrong Cork Co.*

IT'S NEW CHECK IT

(18) LOST CIRCULATION OR LOST RETURNS. November issue of manufacturer's publication, "Drilling Mud," contains informative material on lost circulation. Three types of lost circulation are considered: high-pressure losses, low-pressure losses, and cavernous losses. Illustrations accompany material. *Baroid Sales Division, National Lead Co.*

IT'S NEW CHECK IT

(19) DIFFERENTIAL PRESSURE FLOW VALVE. New eight-page bulletin gives complete description of differential pressure flow valve. Operation of valve and design of flow valve installation are featured. Also treats testing, repairing, and resetting. *Guiberson Corp.*

IT'S NEW CHECK IT

(20) ALLOY-STEELS STOCK LIST. A 24-page booklet lists sizes, shapes, finishes, and conditions of medium carbon, high carbon, case hardening, free machining, carbon-manganese machinery steel, heat-treated alloys, and tool steels available for shipment. Booklet also explains manufacturer's certified alloy-steel plan and contains tables of A.I.S.I. and S.A.E. standard steel compositions. *Joseph T. Ryerson & Son, Inc.*

IT'S NEW CHECK IT

(21) REMANUFACTURED ENGINES. A folder showing the process used in "remanufacture" of General Motors diesel engines gives the prices on both stationary engines and engines in Allis-Chalmers tractors, together with a description of the remanufacturing process. *Stewart & Stevenson Services.*

IT'S NEW CHECK IT

(22) LIGHT-WALL WELDING FITTINGS. New folder describes fabrication of light-wall stainless-steel fittings. Printed in two colors, folder contains, in addition to the data on fabrication of these fittings deep drawn from sheet, a list of features which make it possible to build low-cost stainless-steel piping systems with fittings of this type. *John B. Astell & Co.*

IT'S NEW CHECK IT

(23) NEW CENTRIFUGAL PUMP. Two-color pamphlet describes centrifugal pump which reduces costs of pumping corrosive fluids through ease of handling, prevention of corrosion to pump parts, and lower unit maintenance. Material emphasizes integral casting of the pump volute and the drip pocket; any acid or caustic solution which leaks through the stuffing box, drips onto material capable of withstanding the corrosive qualities of the fluid. *Peerless Pump Division, Food Machinery Corp.*

IT'S NEW CHECK IT

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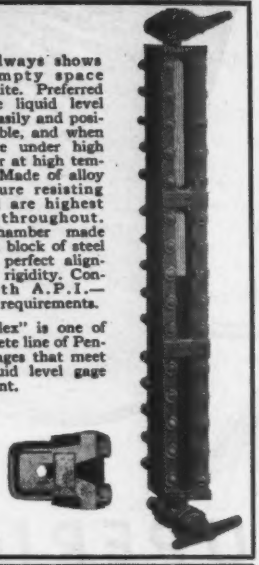

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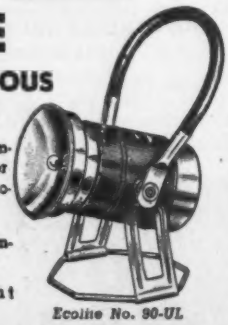

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REFINING

Fuel Saving Hints Are Outlined in Handbook

Valuable information obtained through wartime experience in fuel savings by industrial and commercial fuel users has been compiled by the Bureau of Mines in a 169-page handbook outlining ways to conserve fuel in commercial plants and other establishments.

During the war individual plants reported savings on oil and natural gas up to as much as 60 per cent of their annual consumption, according to James Boyd, director of the Bureau of Mines.

A copy of this handbook, Bulletin 466, "A Guide for Reducing Fuel Consumption in Commercial Plants," may be obtained only from the superintendent of documents, Government Printing Office, Washington 25, D. C.

Record High Predicted For Taxes on Products

WASHINGTON. — Revenue from the three federal oil taxes for the first 11 months of 1947 was only $7,000,000 short of collections for all of 1946, it was reported December 29 by the Internal Revenue Bureau. Indications are that the 1947 collections will top the 1945 high of $536,000,000.

November collections included $36,994,502 from gasoline against $34,427,384 in the same month in 1946; $5,068,259 from lubricating oil against $7,008,969, and $1,023,186 from pipeline transportation against $1,211,691.

For the 11-month period, gasoline returned $406,309,303 against $373,826,655 in the corresponding period in 1946; lubricating oil, $70,096,452 against $66,205,475, and pipe-line transportation, $16,229,962 against $13,660,642, the bureau announced.

Utility Fuel-Oil Use Shows November Drop

Fuel oil consumed during November by electric utility power plants totaled 3,862,365 bbl., a drop of 11.6 per cent from the consumption figure of a year ago and a decline of 4.4 per cent from October.

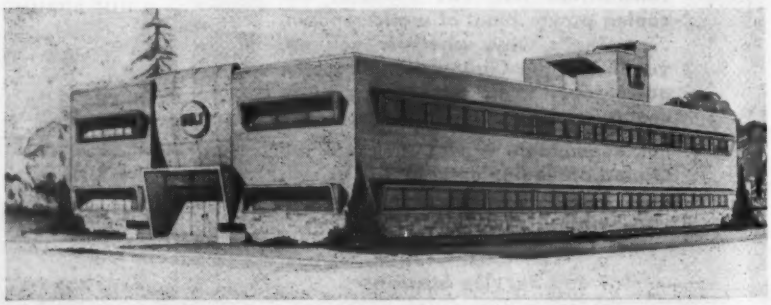
Consumption of natural gas, however, showed a gain of 30.6 per cent over the same month a year ago but a drop of 18.5 per cent from October. Total gas consumption in November was 30,798,219 M.c.f.

Southern Pacific Orders More Diesel Locomotives

HOUSTON. — Further evidence of the movement toward dieselization by the nation's railroads has been given by Southern Pacific lines.

Southern Pacific has announced the purchase of an additional 20 diesel-electric freight locomotives and 20 diesel-electric switch engines at a cost of about $12,000,000.

The new orders will raise to 230 the diesel-electric locomotives of various types owned by the railroad.



Construction is scheduled to start early in January on Gulf Oil Corp.'s new chemical and geological laboratory building in Houston. The building will house nonresearch facilities of the production division, particularly those for analysis and testing. The stone and brick structure, to be erected on a 250-ft. square tract in West Houston, is designed so that additions can be made later if desired. Completion is due in August. Laboratory groups now in the Gulf Building in downtown Houston will be moved to the new building, thus releasing badly needed office space. The new laboratory was designed by Gulf's civil engineering department

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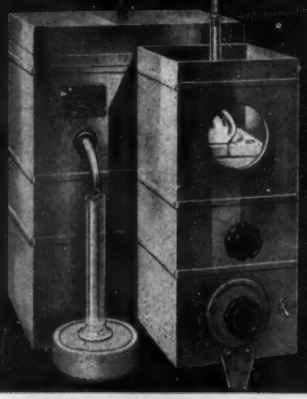

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In addition, the railroad will have 182 diesel-electric switch engines. The new freight locomotives are of 6,000 hp. each; the switch engines, 1,000 hp.

Asphalt Processing Plant Building at Perth Amboy

NEW YORK.—Construction of an asphalt processing plant near Perth Amboy is well under way and the plant is expected to be completed by May 15, according to officials of Witco Chemical Co. The plant will process a minimum of 50,000 tons of asphalt per year, it is announced, and will employ between 50 and 100 men when in full operation.

The new unit is located on a 30-acre tract, with railroad and truck transportation outlets, officials said. Eventually the plant will be expanded.

Raw asphalt will be processed to make various specialty products such as waterproofing, insulation, battery and rubber requirements and for allied uses of asphaltic materials, company officials said. The Witco company has two similar plants in other parts of the country, one being located in Illinois.

German Synthetic Oils Show Good Properties

A synthetic lubricating oil produced by a German chemical plant performed better in several respects than a standard German petroleum oil, according to information contained in one of 12 reports on oil testing now on sale by the Office of Technical Services, Department of Commerce.

The reports describe procedures used for testing synthetic and petroleum lubricating oils in the United States, Great Britain, and Germany, giving tables showing chemical and physical characteristics of the synthetic and petroleum oils at selected times during the tests and details of the methods used.

Synthetic Rubber Use Shows Drop from 1946

Consumption of synthetic rubber in the United States during 1947 totaled 554,000 long tons, against 761,699 long tons during 1946, according to a year-end review prepared by the Rubber Manufacturers Association.

Consumption of natural rubber during the past year totaled 556,000 long tons, twice the 277,597 long tons consumed during 1946.

Production of passenger car, truck, and bus tires and inner tubes exceeded 1946 production.

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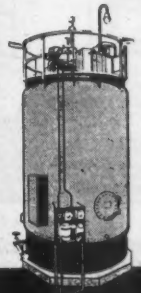

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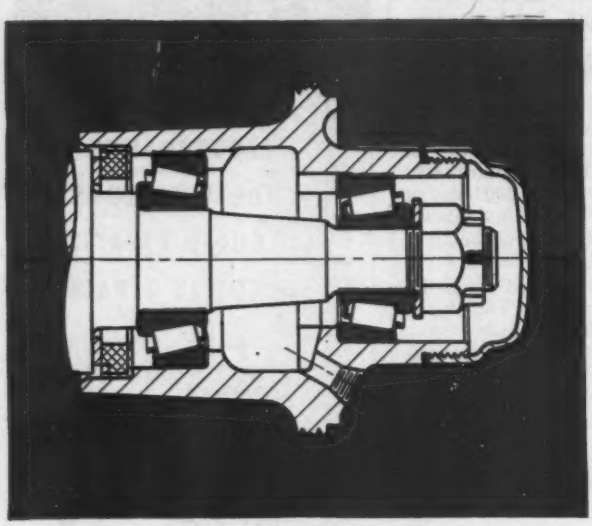
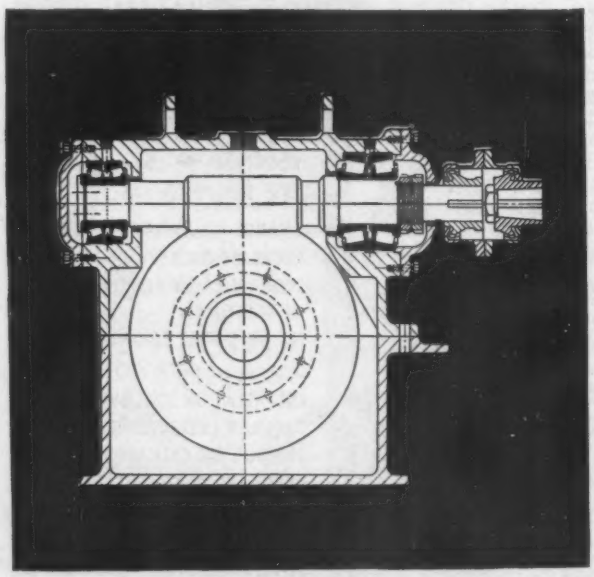
P47–3e

How to carry combinations of radial and thrust loads



TRACTOR FRONT WHEEL *in which both thrust and radial loads are carried on single row Timken bearings. From whichever way the load may come, it will be handled with minimum friction and wear.*



APPLICATION *of Timken Bearings on the worm shaft of a worm gear drive. The load on the worm shaft bearings, due to the operation of the worm, is primarily thrust. There is considerable radial load however, arising from the separating force of the gears and also possibly from overhung driving loads. This is another application for which the tapered roller bearing is ideal.*

THESE drawings show how Timken tapered roller bearings are effectively used where both radial and thrust loads must be carried. They may give you an idea for projects now on your boards.

Because it is a *roller* bearing, the Timken bearing can carry the heaviest loads. Because its rolls are *tapered,* it can carry both radial and thrust loads in any combination.

From whichever direction the loads may come, this tapered design enables the Timken bearing to carry them, one at a time or simultaneously. The cost of providing a separate type of bearing for each load is eliminated. Bearing housings and mountings are simplified, with a saving in cost, weight, and space.

For help in putting these important advantages of Timken bearings to work in the product you're designing, call upon the confidential service of the Timken engineer. He will help you select the precisely correct bearing for your job.

Remember, Timken is the only bearing manufacturer which makes its own steel. And Timken is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

Additional copies of this page and further information on this or other applications of Timken bearings are yours for the asking. Write — The Timken Roller Bearing Company, Canton 6, Ohio.

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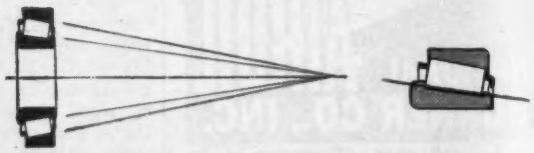

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All lines drawn coincident with the faces of rollers, cone and cup meet at a common point on the axis of the bearing.

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Load is distributed along full length of roller, giving greater capacity, precision, and rigidity, with less wear and distortion.

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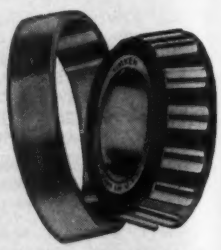
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬮ AND THRUST →⬮← LOADS OR ANY COMBINATION →✳←

NATURAL GAS

Natural-Gas Industry Gains Large During 1947, A. G. A. Report Reveals

NATURAL-GAS sales by public utilities increased 14 per cent during 1947 and totaled 2,503,637,000 M.c.f., according to preminary estimates of the American Gas Association. Number of customers served with natural gas increased 7.2 per cent and sales revenues increased 20 per cent compared with 1946.

In a year-end review, Hudson W. Reed, president of A.G.A., said that the gas utility industry, including natural, manufactured, and mixed gas, continued its unbroken record of expansion in 1947, scoring significant gains in many directions.

"It served more people than ever before and its revenues from all classes of service reached an all-time peak," he said. "Reflecting the great industrial and business activity, revenues from commercial and industrial gas sales advanced more than in any previous year in the past decade, including the previously unmatched war years. New operating methods and an industry-wide integrated research and promotional program on a scale hitherto unapproached hold great promise for 1948."

At the end of the year, the A.G.A. estimated, there were 21,590,000 customers of gas utility companies, equivalent to an increase of 3.2 per cent over 1946. Of this number, 10,268,000 were receiving natural gas, 8,776,000 were receiving manufactured gas, and 2,374,000 were served with mixed gas. In addition, the association estimated that 3,500,000 customers were being served with liquified petroleum gas from tanks in territories beyond the reach of utility gas mains.

Total revenues of the gas utility industry during 1947 were $1,407,561,000, a gain of 16.2 per cent over 1946, greatest in the industry's history. Since 1941, total revenues have advanced 54 per cent. Revenues from natural gas sales increased 20 per cent, mixed gas 12.7 per cent, and manufactured gas 9.8 per cent.

Revenues from sales to commercial customers increased 19.5 per cent, to residential customers 16.3 per cent, and to industrial customers 15.8 per cent over 1946.

While natural gas sales by utilities rose 14.1 per cent during 1947, sales of mixed gas rose 18.7 per cent to a total of 176,286,000 M.c.f. and manufactured gas rose 8.4 per cent to 439,233,000 M.c.f.

Other highlights in Reed's review of the year include:

The capacity of the nation's gas pipe line system was increased by 2 billion cubic feet per day, equivalent to 80,000 tons of coal, by the addition of 5,370 miles of pipe line which brought the total to 229,000 miles, a figure equal to the trunk line railroad tracks of the country.

Proved recoverable natural gas reserves at the start of the year were 160.6 trillion cubic feet, an increase over the previous year of 12.8 trillion or 2½ times the amount withdrawn.

Manufactured gas companies are turning to liquified petroleum gas to increase peak loads, and to a new oil gas process to produce high B.t.u. gas for distribution alone or to be interchanged with natural gas.

Production of gas appliances increased sharply during 1947 for all types except home heating equipment.

Extensive research is being done on new methods of manufacturing gas, including catalytic reforming of hydrocarbon gases, catalytic cracking of heavy oils, and gasification of oil and coal at temperatures higher than used in the petroleum industry.

The estimates of A.G.A. for 1947 sales of natural gas by utilities are given in the table.

	1947	1946	% change
Customers—			
Total	10,268,000	9,582,000	+ 7.2
Residential	9,500,000	8,859,000	+ 7.2
Commercial	725,000	680,000	+ 6.6
Industrial	37,000	37,000	+ 0.0
Other	6,000	6,000	.....
Sales (M.c.f.)—			
Total	2,503,637,000	2,194,948,000	+14.1
Residential	745,583,000	606,128,000	+23.0
Commercial	225,352,000	183,368,000	+22.9
Industrial	1,504,911,000	1,354,560,000	+11.1
Other	27,790,000	50,892,000	.....
Revenues—			
Total	$855,185,000	$712,804,000	+20.0
Residential	473,053,000	386,606,000	+22.4
Comercial	104,070,000	82,858,000	+25.6
Industrial	272,417,000	235,201,000	+15.8
Other	5,646,000	8,139,000	.....

Cabot Carbon Petitions For Natural Gas Supply

Cabot Carbon Co. last week filed an application with the state corporation commission asserting that because so much of the current allowable is assigned to unconnected wells or to wells now making up overproduction, that it is unable to maintain full operation of its plant.

Officials of the carbon plant, which is located near Oklahoma City, say that unless allowables are revised to permit the plant to obtain a greater supply of natural gas in the Guymon-Hugoton field of Texas County, drastic curtailment of operations and possible shut-down faces the plant.

So. Cal. Gas Seeks to Serve Imperial Valley

Southern California Gas Co. has applied to the California Public Utilities Commission for authority to acquire three butane-air gas systems now operated in the Imperial Valley towns of Bradley, El Centro, and Calexico by Coast Counties Gas & Electric Co. of Santa Cruz.

If the deal is approved, Southern California will continue to operate the systems on butane for the time being but will apply to the Federal Power Commission to convert them to natural gas by tapping the 30-in. line from West Texas at Desert Center and laying an 8-in. line south through the Imperial Valley to Calexico. Franchises also will be sought to serve natural gas in other communities in the Valley. The purchase price of the three butane-air systems is approximately $800,000, and the company plans to spend in excess of $1,000,000 in pipe line construction if approval is received.

T. G. T. Increases Wages, Living-Cost Allowances

HOUSTON.—To offset continued rising prices, Tennessee Gas Transmission Co. has given its employes a wage and cost-of-living increase ranging up to $40 a month for salaried personnel and 10 cents an hour for hourly paid field employes.

The cost-of-living increase was $15 for those receiving up to $300 a month with a proportionate increase up to $40 for those above that figure. The hourly paid group was given a 4-cent increase and an additional 6 cents an hour cost-of-living increase. In addition, the company distributed a total of $265,000 in Christmas compensation checks.

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PIPE LINES

Stanolind Prepares for Loops and Extensions

STANOLIND PIPE LINE CO. is preparing for 1948 main line looping and extension projects totaling more than 500 miles. These will continue the company's program which has been in progress for the last 2 years. The main line projects will particularly expand facilities for transporting crude oil from West Texas and Rocky Mountain areas. Some of the undertakings have been rearranged and deferred because of scheduled pipe deliveries which did not materialize in 1947.

Stanolind Pipe Line Co. completed the welding on December 24, 1947, for the construction of a 50-mile 8-in. crude-oil line from the Post pool, Garza County, Texas, to a connection with the company's 16-in. trunk line near Petersberg. The last 2 miles of coating and lowering in were finished later last week. The contractor, R. H. Fulton & Co., has been moving equipment to commence construction of a 46.22-mile 16-in. loop between Monroe Junction and Floydada on the Stanolind Drumright-Slaughter main 16-in. line.

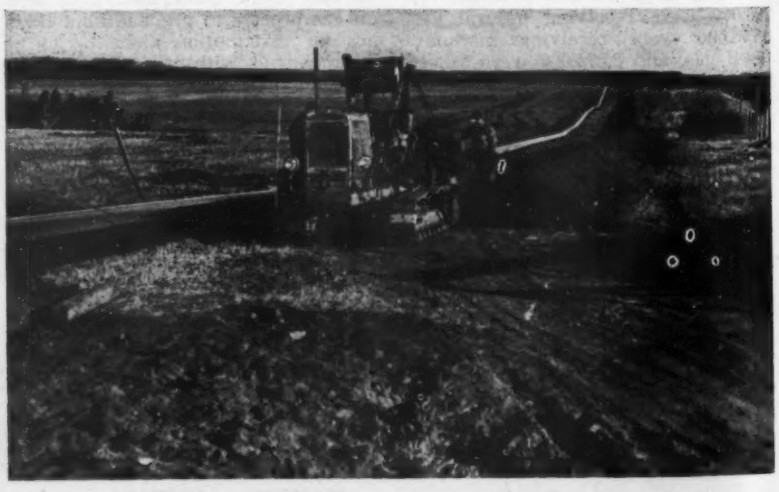
During January contracts are to be let for three additional loops on which it is expected that work is to start in February. These loops are to be located as follows: 5 miles near Bretch station; 14 miles near El Reno; and 15½ miles near Drumright, Okla. These short loops are to be finished March 15.

With the completion of the four loops just mentioned, Stanolind will increase capacity from 83,000 bbl. to 100,000 bbl. daily. During the summer these loops totaling 80.72 miles of 16-in. will be extended by the laying of a total of 164.37 miles of 16-in. pipe in order to further increase capacity of the system to 132,000 bbl. daily. These loop extensions are expected to be in operation October 1.

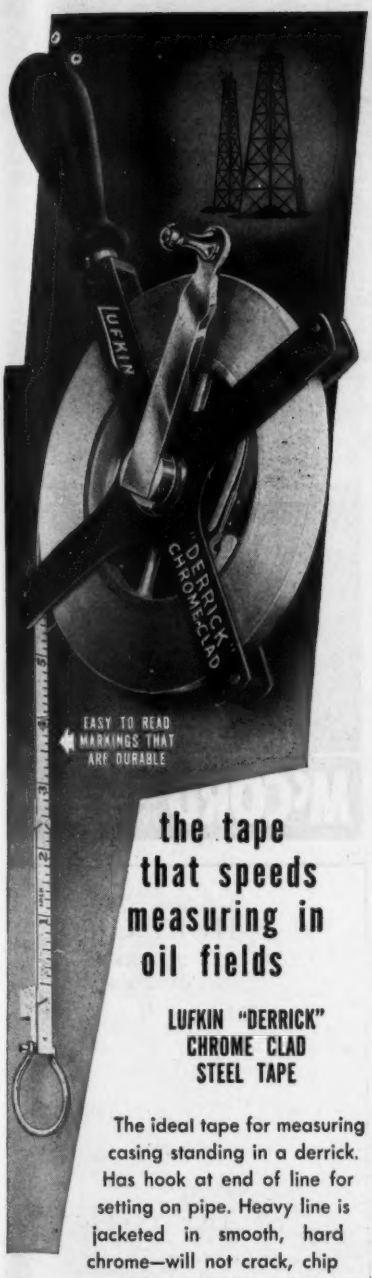
In the loop extension program the Monroe-Floydada loop is to be extended 57.6 miles to Childress, Tex. Other extensions are to be as follows: 42½ miles for the Bretch loop; 38.28 miles for the El Reno loop; and 37.37 miles for the Drumright loop.

For the initial 80.72-mile looping getting under way in January and February, pipe is to be used which was originally scheduled for the Wasson-Wheeler 80-mile 16-in. extension of the main trunk line which Stanolind had intended to build in the summer of 1947. During the time when the company was waiting because of delays in pipe deliveries, the construction program has been changed. However, Stanolind is planning to lay the Wasson-Wheeler 80-mile 16-in. extension during the summer of this year.

Stanolind is laying 28 miles of gathering lines of 3-in. to 8-in. pipe in the Slaughter and Levelland pools of West Texas.



Shown above is construction work in progress on the 100-mile natural-gas line from Kinsella to Edmonton, Alta. The line will carry about 66,000,000 cu. ft. daily when completed. The pipe is being laid at a depth of 4 ft.



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LUFKIN

FOR ACCURACY

Pipe is scheduled to arrive in the first half of this year for the Lysite-Casper, Wyo., 70-mile 12-in. looping to be finished October 1. Stanolind is also planning to lay a 130-mile 8-in. crude-oil line from Wamsutter to Casper, Wyo.

In the construction of 262 miles of loop along the La Plata, Mo.-Manhattan, Ill., section of Stanolind's Drumright-Whiting trunk line, 212.5 miles of 20-in. and 22-in. had been laid up to late last week. Contractors have completed two sections: Job 4 (at the Manhattan end), 60½ miles of 22-in.; Job 3, 45 miles of 20-in. and 15 miles of 22-in. In the section extending from the Mississippi River into Illinois, 67½ miles of 20-in. had been laid; 3½ miles remained to be laid. All pipe is on hand for the La Plata-Mississippi River 74-mile 20-in. section where 28 miles has been completed.

South Plains Pipe Line Bought by Stanolind

Stanolind Pipe Line Co. has bought South Plains Pipe Line Co. with pipe line connections to wells having 9,000 bbl. daily production in Slaughter and Levelland fields in West Texas.

Purchase arrangements were consummated December 19, 1947, with the South Plains company, which has been owned 61 per cent by Mid-Continent Supply Co. and 21 per cent by Honolulu Oil Co. The remainder of the ownership was held by several oil companies.

Pipe Laying Starts For Las Mercedes 16-in. Line

Pipe was arriving in the middle of December for the Las Mercedes-Pamatacual 135-mile 16-in. crude-oil pipe line in eastern Venezuela to be laid for S.A. Petrolera las Mercedes (The Texas Co. and Caracas Petroleum Corp.) by Williams Brothers Co. Pipe laying is starting this week.

The Williams Brothers operations are being directed by A. M. Garber, manager of Venezuelan projects. Jack Goble is superintendent. The two spreads laying pipe for the project are supervised by Marvin Jones and O. R. Martin. Guy S. Connors, vice president, will have general supervision over the undertaking while it is in progress.

Fuel Deliveries from Pipe Lines Show Large Gain

Deliveries of motor fuel from pipe lines during the first 9 months of 1947 showed an increase of 12.2 per cent over the corresponding period of 1946.

Deliveries during the first three-

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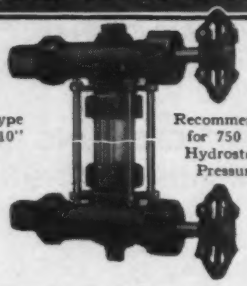

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Recommended for 750 lb. Hydrostatic Pressure

Steel construction throughout with stainless steel interior trim. Automatic shut-off is positive and instantaneous; stainless steel balls shut off the flow of liquid when glass breaks. Heavy duty stuffing boxes, union connections, offset construction facilitate cleaning and simplify glass replacement. Conform with A.P.I.—A.S.M.E. requirements.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

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Oil • Gas • Gasoline • Water Pipelines
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L. H. Favrot — G. A. Peterkin — J. W. Sharman

quarters of 1947 totaled 180,831,000 bbl., an increase of 19,710,000 bbl. over the 1946 deliveries.

Motor fuel turned into lines totaled 180,945,000 bbl., a gain of 20,909,000 bbl. or 23 per cent over the first 9 months of 1946.

Deliveries from lines in September totaled 21,792,000 bbl., against 23,195,000 bbl. in August and 19,819,000 in September 1946.

Stocks in lines and working tanks at the end of September totaled 8,515,000 bbl., against 8,880,000 at the end of September a year ago.

Kimball Lake-Muskegon Six-Inch Line Completed

Campbell, Wyant & Cannon Co. has completed a 30-mile 6-in. natural-gas line between Kimball Lake field, Newaygo County, and Muskegon, Mich., at a cost of approximately $300,000. The job was contracted by Anderson Brothers.

Gas is supplied to the line from Sun Oil Co. wells. Construction of the line was undertaken by Campbell, Wyant & Cannon after Michigan Consolidated Gas Co. gave notice that industrial users of natural gas in the Muskegon area would be limited for a period starting January 1, 1948, which would continue until the new pipe line of Michigan-Wisconsin Pipe Line Co. would be completed from Texas to Michigan.

Continental Motors Corp., which has a one-sixth interest in Campbell, Wyant & Cannon, will receive 100,000,000 cu. ft. annually from the Newaygo field.

Rio Grande Valley Loops Main Line

Rio Grande Valley Gas Co. has completed the laying of a 43½-mile 10-in. line which extends from San Salvador through Harlingen to San Benito, Tex., serving as a loop for the company's 12-in. main transmission line between Mission and Brownsville, Tex.

The Rio Grande Valley Gas Co. transmits gas from six gas fields in the Rio Grande Valley including the San Salvador, La Blanca, and North Mercedes fields.

Mississippi River Looping Project Nears Completion

For the laying of 172 miles of 22-in. looping for Mississippi River Fuel Corp., the contractor, Holland Construction Co., is in the process of completing the last mile this week.

The part of the Mississippi River Fuel looping program which was contracted by Holland has been under construction for approximately a year in various sections in Arkansas and Louisiana.

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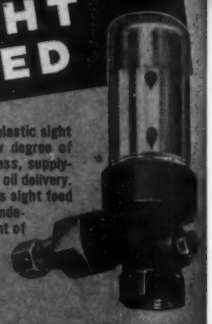
"CLEARSITE"
SIGHT
FEED

McCord "Clearsite" plastic sight feeds provide a new degree of visibility and clearness, supplying positive proof of oil delivery. Due to its design this sight feed may be used as an independent sight at point of lubrication. As an accessory it can be added to any lubrication system. Specify "Clearsite."



McCORD "SF" LIQUID SIGHT FEED LUBRICATORS

A highly developed lubricator particularly adapted to cylinder and bearing lubrication. Features Precision built, non-fouling and positive oil delivery system known. Supplied in 1 to 24 feeds. Specify McCord "SF" Lubricator.

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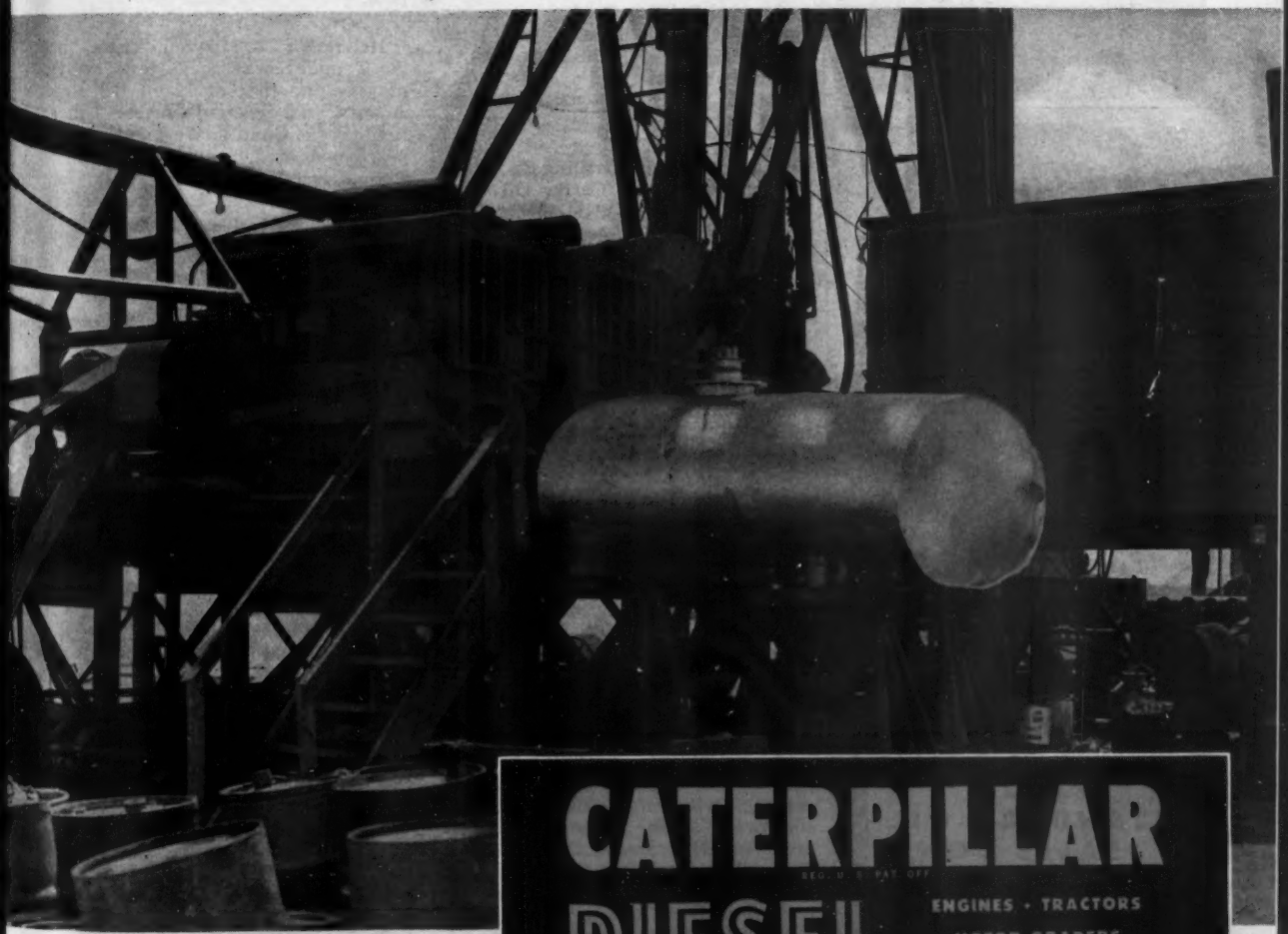
Drilling, under any condition, is no pushover. And when your derrick is out in the middle of the Canadian prairies, where winter temperatures run far below the zero mark, it can be really tough.

To lick that job the Regent Drilling Co., Ltd., of Vermilion, Alberta, installed engines that are tougher still — a pair of 6-cylinder, 115-hp. "Caterpillar" Diesels. And they make it look easy.

"Caterpillar" Diesel Engines are built to tackle the roughest, meanest jobs in the oil industry — to stand up under continuous heavy duty, in heat or cold, dust or moisture — and keep on working faithfully. That rugged dependability, plus long life, low operating cost and the matchless service rendered by a great dealer organization, has made "Caterpillar" Diesels the number one choice for all kinds of oil-field work.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



Two "Caterpillar" Diesel D13000 Engines drive Cardwell "E.C." twin-engine draw-works for Regent Drilling Co., Ltd., at Wardlow, Alberta, Canada.

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Among the Drilling Contractors

Four Contractors' Offices Moved in Recent Weeks

A number of drilling contractors throughout the country have moved their offices in recent weeks. **O'Neal Drilling Co.**, Lubbock, Tex., has moved to 1311 10th Street in Lubbock. **Jones, Shelburne & Farmer, Inc.**, Oklahoma City, have moved their Great Bend, Kans., office to Russell.

J. C. Hawkins, Dallas, has opened a new Houston office at 622 City National Bank Building. General superintendent is Dick Wilkins, and Howard E. Oexman is office manager.

Stewart Drilling Co. has set surface pipe on J. K. Wadley 1 Enyart, wildcat in C SE SE 7-16s-24w, east of Spirit Lake field, LaFayette County, Arkansas. Test is contracted for 4,000 ft.

Falcon-Seaboard Drilling Co., Tulsa, will make hole on Carter Oil Co. 1 Cochran, NW NE NW 11-33-1w, Sumner County, Kansas, wildcat 4½ miles east of Perth pool and 3½ miles south of Wellington. Carter holds a 1,440-acre block.

Lyle Cashion, Ltd., Houston, is drilling R. M. Harris, W. M. Paine, and C. Porter Johnson 1 Yarbrough, wildcat in SW NW SE 36-10n-10w, 5 miles east of Sandersville, Jones County, Mississippi.

Sullivan Brothers Drilling Co., Healdton, Okla., et al have started 1,500-ft. test in Carter County, Oklahoma, their 2 Minter, NW SW NW 9-5s-1e.

Mallard Drilling Co., Wichita, and Westgate-Greenland Oil Co. have staked location for 2 Hart, SW SW SW 33-17-1, McPherson County, Kansas, wildcat 1 mile east of Georob pool.

Delta Drilling Co., Shreveport, has contract with H. A. Baker for test southwest of the three-well LaRue area of Henderson County, East Texas. Location is on 89-acre Guantt tract, B. C. Walters Survey.

Nowery Drilling Co., Shreveport, has started moving in on first of two tests for Phillips Petroleum Co. on Harrison County, Texas, side of Longwood oil and gas field, Caddo Parish, Louisiana. First well is 1 Rudd, in McMillan Survey, and about ½ mile south of Sam E. Wilson Oil Co. 1 Hearne, which was recent distillate extension well.

Dunlap & Graham Drilling Co., Long Beach, is contractor for Shell Oil Co., Inc., 25 Rindge, 8-2s-12w, Inglewood field, Los Angeles County, California.

Howard Brunson is drilling Robert L. Williams 1 Soeken, SE SE SW 30-20-11, Barton County, Kansas, ¾ mile northwest outpost to Kowalsky pool.

Helmerich & Payne, Tulsa, has work under way at 2 tests, which may be the first of 12 on the Reid, Arthur, and Hogan leases in Toborg field, Pecos County, West Texas. Proposed tests will be three each on the Arthur and Bob Reid leases; and six on the Hogan lease. Location is about 1½ miles west and slightly north of Iraan.

T. P. Pike Drilling Co., Los Angeles, will resume work soon, it is reported, on the Marine Exploration Co. underocean wildcat at Seal Beach, Calif. The directionally drilled hole may be redrilled.

Fleet Drilling Co., Ada, Okla., and Russell Maguire are under way on 4,700-ft. test, their 1 Rogers, SW NE SW 33-4n-8e, Pontotoc County, Oklahoma.

Roberts Drilling Co. and Vernon Oil Co. have staked location for 1 Smith, SW SW SW 23-12-16, 1½ mile south outpost to Blue Hill pool, Ellis County, Kansas.

Santa Fe Drilling Co., Santa Fe Springs, Calif., is scheduled to drill Standard Oil Co. of California H-30 well in Huntington Beach field, California.

B. G. Byars, Tyler, Tex., is rigging up for Hunt Oil Co. 1 Tucker, wildcat 1 mile north of Jacksonville, Thomas Quevado Survey, Cherokee County, East Texas. Contract is for Woodbine test.

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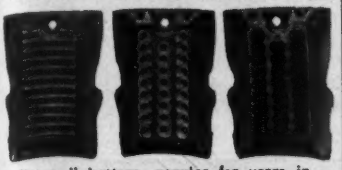

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HOUSTON, TEXAS

Commonwealth Drilling Co., Calgary, Alta, has completed Gibb-Mac 2, LSD 9, 34-49-1w4, Lloydminster field with good producer indicated. Rig is being moved to Saskatchewan side to drill Community Services 35, and second rig is completing Community Services 34. On Alberta side, same firm has finished Command-Lloyd, NE 3, 16-50-1w4, at 1,920 ft. as a better-than-usual producer.

Rhodes Drilling Co., Abilene, Tex., has a contract with Petroleos Mexicanos and is drilling its second deep test in Chihuahua state.

Carter Drilling Co., Dallas, has moved its offices to 107 Guardian Life Building.

Hassie Hunt is below surface pipe on H. L. Hunt 1 Alfred, wildcat in NE NE 15-1s-14e, Washington County, Mississippi.

General Petroleums, Calgary, Alta., recently spudded Federal Oil Syndicate 2, LSD 8, 8-19-11w4 in southern section of Steveville-Princess field, Canada.

Alex McCutchin, Dallas, will drill Cities Service Oil Co. 1 Schittler, wildcat in Section 1648, TE&L Survey, 6½ miles northeast of Woodson, Throckmorton County, Texas.

Gene Reid Drilling, Inc., Bakersfield, has contract to redrill Monterey Exploration Co. 4 Clare, Edison field, California.

Calvert & Willis, Inc., Olney, Ill., will drill Sells Petroleum, Inc. 3-C Hickman & Elliott, 2,400-ft. test. NW NE 24-5s-14w, Posey County, Indiana.

T. T. Mason, Enid, Okla., is drilling Madison County, Illinois, wildcat for Magnolia Petroleum Co., the 1 Johanestottle, SW SE NW 15-5n-5w.

Santa Maria Drilling Co., Long Beach, will drill General Petroleum Corp. 1 Fullerton, Cat Canyon field, California. Santa Maria will also drill Rice Ranch Oil Co. 12 Brookshire, Orcutt field, California.

P. Doran, Vandalia, Ill., has a Shelby County, Illinois, wildcat under way for J. W. Reynolds, the 1 E. F. Clay, SW SW NW 2-11n-4e.

Dunlap & Graham, Long Beach, will drill Shell Oil Co., Inc. 25 Rindge, Inglewood field, California.

Delta Drilling Co., Evansville, has contract for Joe Reznik 1 W. Kuykendall, wildcat in 6-L-22, 1 mile northwest of Lisman, Webster County, Kentucky.

George Terry has started Crestmont Oil Co. 1 U. S., 13-4n-18w, Ramona field, California.

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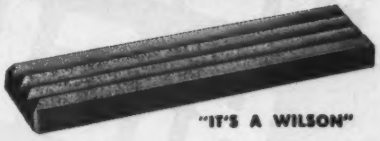

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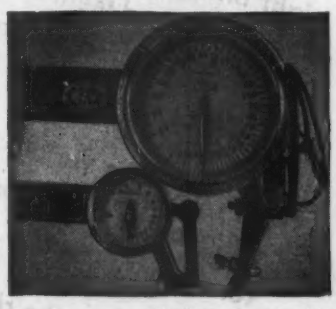

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Exploration and Drilling

Southwest Kansas Prospects Improve

THE geological reasoning which has led several companies to persist in exploration work in southwestern Kansas, particularly east of Hugoton gas field, looks good, and may be completely confirmed by the final results of Stanolind Oil & Gas Co. 1 Wheatley, NE SW 23-33s-31w, Seward County, Kansas.

As of the latest test data available, Stanolind could hardly be said to have a commercial well yet, but still had reasonably good prospects. Swabbing tests had yielded 11½ bbl. of oil and 2½ bbl. of water per hour from perforations at 5,865-90 and 5,910-20 ft. near the lower part of the Ste. Genevieve formation in the Mississippi lime. Previous swabbing tests at slightly lower depths had yielded at various times a few hundred barrels of oil, water, and emulsion.

This well was originally drilled to 7,340 ft. total depth, at which point it had penetrated 221 ft. of Arbuckle lime. Many drill-stem tests were made from the Lansing (Pennsylvanian) down through the Ste. Genevieve and St. Louis of the Mississippian, the Viola, and in the Simpson, as well as the Arbuckle. In addition a core was taken in the Simpson, and three cores in the Arbuckle. From an elevation of 2,749 ft., the datum tops reported are: Lansing —1,565 ft., Mississippi —2,853 ft., Ste. Genevieve —2,897 ft., St. Louis —3,237 ft., Misener —4,093 ft., Viola —4,103 ft., Simpson —4,311 ft., Arbuckle —4,370 ft. As a regional check, on top of the Arbuckle the Wheatley was 462 ft. higher than Stanolind 1 Rickers in 27-32s-29w, about 15 miles to the northeast.

Drill-stem tests in the Arbuckle gave encouragement to the idea that somewhere that formation may carry oil, even if not in the Wheatley. A test at 7,149-58 ft. recovered 80 ft. of salty, oil-cut mud, and a small amount of free oil. At 7,150-68 ft., a test recovered 410 ft. of mud, 360 ft. of oil-and-gas-cut mud, and 68 ft. of salt water. A core at 7,141-46 ft. recovered 4 ft. of fine crystalline dolomite with fair porosity, staining, and odor. Another core at 7,158-68 ft. had at the bottom of the core 1½ ft. of dolomite with fairly good porosity, good stain, and odor.

Although the Simpson would hardly be expected to do anything if the generally held belief that thin Mississippian section was a prerequisite to good Simpson production also applied to this territory, a core at 7,066-71 ft. recovered 3 ft. of porous sand, with slight stain and fair odor. A drill-stem test at 7,057-71 ft. recovered only 50 ft. of mud and 150 ft. of salt water.

Of seven drill-stem tests in the Mississippian section, only the two lowest, at 6,150-6,208 ft. and 6,560-79 ft. were completely negative. At 6,013-91 ft., in the upper part of the St. Louis, 210 ft. of oily mud and 360 ft. of oily and salty mud were recovered. At 5,915-6,005 ft., taking in some of the lower Ste. Genevieve and upper St. Louis, gas, oil-cut mud, and a little free oil were recovered. Three other drill-stem tests, all in the Ste. Genevieve, 5,694-5,754 ft.; 5,790-5,839 ft.; and 5,845-5,905 ft., had gas, mud, and sometimes oil-cut-mud recoveries.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

OKLAHOMA.—Stanolind Oil & Gas Co. may have the world's deepest producing oil well at its 1 Briscoe Unit, near Bradley in Grady County, which flowed 18 bbl. hourly on drill-stem test. Only one remaining active drilling location in newly-opened West Shawnee Lake pool.

ROCKY MOUNTAIN.—Kibby sand discovery in Musselshell County promises to be best in Montana for the year.

SOUTH LOUISIANA.—Texas Co. 2 Realty Operators, deep exploration in the Vacherie (Convent) area of St. James Parish, is drilling below 14,058 ft. Superior Oil of California abandons the 1-A Gulf of Mexico, State Lease 884, record deep off-shore wildcat.

KANSAS.—Stanolind 1 Wheatley has good prospects of deep Mississippi lime oil production just east of Hugoton gas field in Seward County.

CALIFORNIA.—The fractured Schist zone in Arvin-Mountain View area of Kern County, discovered last year, has been reopened by Pacific Western Oil Corp. 53 Greer, flowing better than 500 bbl.

WEST TEXAS.—Sun Oil Co. set pipe on its second Coke County discovery; the well made a spray of oil and gas after the tester was closed, and recovered 460 ft. of high-gravity oil.

TEXAS GULF COAST.—The Texas Co. is preparing to drill a 12,000-ft. test, the J. C. E. Peterson, northeastern Calhoun County, approximately 3½ miles northeast of Olivia and 13 miles east-northeast of Port Lavaca. New pay in Columbus field, Colorado County, also extends the field.

EAST TEXAS.—Byrd Oil Co. distillate prospect 3½ miles west of San Augustine, found no shows in the Travis Peak to 9,017 ft. Operators set pipe to 8,697 ft. and will re-perforate for further testing in the Pettit lime.

NORTH TEXAS.—Montague County wildcat, northwest of Bowie, kicked off and flowed 100 bbl. of oil in 1 hour and 5 minutes.

CANADA.—The rapidly-growing Leduc field may get a northeastern extension in Central-Pyrcz 2, LSD 12. 25-50-26w4. The Imperial-Woodbend 1, important test 2½ miles northwest of Leduc, got oil showings and a good gas flow.

KANSAS

Stanolind Hits Pay With Seward County Wildcat

STANOLIND OIL & GAS CO. 1 Wheatley, wildcat 15 miles northeast of Liberal, Seward County, has hit pay in Mississippi lime at 5,865-90 ft. and 5,910-20 ft. This test, in C NE SW 23-33-31, swabbed 11½ bbl. of oil and 2½ bbl. of water per hour through perforations. Total depth is 7,340 ft., plugged back depth 5,921 ft., and 5-in. casing set at 5,980 ft. Stanolind tested numerous shows from Lansing section at 4,435-55 ft. to Arbuckle, but results were unsatisfactory.

Delta Production Co. and Crow Drilling Co. have run casing at 1 Gager, SW SW SE 28-8-16, ½ mile west of north end of Laton pool, Rooks County. Test hit several good shows in Lansing-Kansas City and casing was set in Arbuckle at 3,380 ft.

W. L. Hartman 1 Peterson, NW SW NW 22-8-19, Rooks County, ½ mile north of Webster pool and ½ mile southeast of Silvers pool, filled hole with 2,300 ft. of oil and 150 ft. of water in 12 hours. Total depth is 3,454 ft. and pay is Arbuckle which was topped at 3,449 ft.

. Two offsets—one for 2,197 bbl. potential and the other dry—have been completed to East Barry pool, Rooks County. Continental Oil Co. 1 Thompson, SW SE NE 6-9-18, was the producer with pay from Arbuckle at total depth of 3,499 ft. Dry hole was chalked up by Gulf Oil Corp. 1 Hilgers, SW NW SW 5-9-18, southeast offset to discovery. Pool-opener was Continental 1 Gilbert, NE NE SE 6-9-18, completed in August with physical potential of 609 bbl.

For the week, 48 new locations were registered and 72 completions. Cowley, Ellis, Barber, and McPherson led in new locations with 6, 6, 5, and 5, respectively. Ellis, Rice, and Russell were high in completions with 8, 8, and 7.

KANSAS SUCCESSFUL WILDCATS

Sedgwick County: Drillers Gas Co. 1 Ronbach, C N/2 NW NE 11-27s-1w, pumped 25 bbl. of oil per day from Lansing-Kansas City at 2,716-20 ft., TD 2,594 ft.

Stafford County: Old well drilled deeper—Magnolia 1 Ranson, C E/2 SE NE 7-24s-11w, pumped 18 bbl. of oil per day, TD 3,797 ft., no tops reported.

KANSAS WILDCAT FAILURES

Barton County: Bay Petroleum et al 1 DeWerff, SW SW SE 25-20s-12w, dry, TD 3,411 ft., anhydrite 578 ft., Lansing-Kansas City 3,133 ft., Arbuckle 3,378 ft.

Cowley County: Texas Co. 1 Myer-Duncan, NW NW NE 33-30s-5e, dry, TD 3,476 ft., Lansing-Kansas City 1,836 ft., Stalnaker 1,849 ft., Kansas City 2,226 ft., stray sand 2,362 ft., Marmaton 2,542 ft., Basal Ft. Scott 2,681 ft., Bartlesville 2,842 ft., Mississippian 2,888 ft., Arbuckle 3,343 ft.

Shawyer & Graham 1 Chance, SW SW SW 14-31s-5e, dry, TD 3,040 ft., Mississippi lime 3,011 ft.

Decatur County: Bennett & Roberts Drilling 1 Ellis, SW SW NW 22-5s-26w, dry, TD 4,070 ft., Topeka 3,330 ft., Heebner 3,541 ft., Toronto 3,516 ft., Lansing-Kansas City 3,579 ft., conglomerate 3,901 ft., cherty conglomerate 3,988 ft., Arbuckle 4,018 ft.

Ellis County: Ben Brack Oil Co., Inc. 1 Yohe, NW NW SE 10-11s-20w, dry, TD 3,705 ft., anhydrite 1,435 ft., Kansas City 3,314 ft., conglomerate 3,590 ft., Simpson 3,645 ft., Arbuckle 3,654 ft.

J. M. Huber et al 1 Madden, SE SW SW 7-14s-18w, dry, TD 3,871 ft., Heebner 3,442 ft., Dodge 3,465 ft., Kansas City 3,491 ft., Marmaton 3,728 ft., conglomerate 3,760 ft., Arbuckle 3,799 ft.

Harper County: Weller 1 Cox, C S/2 SE SE 5-31s-9w, dry, TD 4,964 ft., Lansing 3,749 ft., Mississippian 4,447 ft., with flow of gas, Viola 4,730 ft., Simpson 4,799 ft., Arbuckle 4,927 ft.

Kingman County: Ohio Oil Co. 1 Livingston, C SE SE 20-28s-7w, dry, TD 4,690 ft., Topeka 2,537 ft., Basal Oread 3,062 ft., brown lime 3,263 ft., Lansing-Kansas City 3,274 ft. with show of free oil, Mississippian 4,009 ft. with show of gas, Viola 4,382 ft., Simpson 4,409 ft., Arbuckle 4,525 ft.

Lyon County: Rex & Morris 1 Haughton, SE SW SW 21-21s-12e, dry, TD 2,070 ft., Mississippi lime 2,040 ft., no shows.

McPherson County: Woodriver Oil & Refining 1 Becker, SE SE SE 2-17s-1w, dry, TD 2,834 ft., Mississippian 2,770 ft.

Norton County: Emergency Exploration & Artnell Oil Co. 1 Interstate Cattle Loan, C NW NW 12-3ds-43w, dry, TD 5,846 ft., Blaine 650 ft., anhydrite 1,245 ft., Lansing-Kansas City 3,002 ft., Morrow sand 4,622 ft. with show of gas, Mississippian 4,724 ft., Viola 5,618 ft., Simpson 5,718 ft., Arbuckle 5,747 ft.

Phillips County: Phillips Petroleum 1 Grau, NE NE SW 25-2s-19w, dry, TD 3,615 ft., anhydrite 1,540 ft., Heebner 3,175 ft., brown lime 3,200 ft., Lansing-Kansas City 3,219 ft., Basal Kansas City 3,444 ft., Arbuckle 3,562 ft.

Sedgwick County: Russell McGuire 1 D. T. Smith, SW SW SE 24-26s-1w, dry, TD 3,461 ft., Kansas City 2,574 ft., cherty conglomerate 3,040 ft., Mississippian 3,044 ft., Viola 3,409 ft., Simpson dolomite 3,425 ft.

J. P. Gaty 1 J. A. Tobin, C N/2 NW NE 29-26s-2e, dry, TD 3,317 ft., Mississippian 2,947 ft., Viola 3,317 ft.

Stafford County: R. L. Williams 1 Mellies, NE NE SW 31-21s-11w, dry, TD 3,465 ft., anhydrite 540 ft., Heebner 3,030 ft., lime 3,166 ft., Lansing 3,187 ft., Viola 3,480 ft., Simpson 3,524 ft., Arbuckle 3,528 ft.

MISSOURI WILDCAT FAILURES

Clinton County: W. M. Peppas 1 Kester, NE NE SE 28-57n-30w, dry, TD 881 ft., Lansing-Kansas City 63 ft., Pleasanton 320 ft., Marmaton 417 ft., Cherokee 533 ft.

Jackson County: Palette et al 1 Gaugh, SE SE NW 24-60n-32w, dry, TD 235 ft., Kansas City 60 ft., show of oil 150-55 ft., Pleasanton 235 ft.

LA.-ARK.

Cypress Lake Well Continues Testing

EL DORADO.—A. E. Stewart's 2 Bailey-Johnson, SE SE 20-16s-25w, in the new Cypress Lake field of Miller County, continued testing at total depth of 4,470 ft. On a 24-hour test, through 12/64-in. choke, it flowed 63 bbl. of 35.6°-gravity oil with a gas-oil ratio of 7,142 cu. ft. Tubing pressure was 970 psi., and casing pressure 1,225 psi.

In Union County, Stanolind Oil & Gas Co. 1 Magnolia Petroleum Co., NE NE 3-19s-14w, was drilling ahead below 3,876 ft., after drill-stem testing from 3,303-35 ft. Total recovery was 1,950 ft. of fluid, being 1,850 ft. of salt water and 100 ft. of gas-cut mud. Flowing bottom-hole pressure was 1,575 psi. A second test from 3,634-41 ft., open 10 minutes, produced a strong blow and recovered 690 ft. of salt water. Flowing bottom-hole pressure had decreased to 1,450 psi.

In Columbia County, H. L. Hunt 1 Bodcaw, 17-19s-22w, was drilling below 4,257 ft. in shale. Robert W. O'Meara 1 T. F. Moody, 12-16s-22w, was drilling ahead below 5,145 ft. G. H. Vaughn 1 McCall, 30-17s-18w, was last reported drilling at 5,925 ft. in sandy shale.

In Hempstead County, Placid Oil Co. 1 Munday, 2-14s-26w, was drilling below 3,767 ft. after running electrical survey. Tops logged were the Massive anhydrite 2,675-2,805 ft., Paluxy 1,875 ft., and the Travis Peak at 3,415 ft.

In Calhoun County, Houston Oil Co.'s 1 H. B. Gaughn, pumping discovery in 34-13s-16w, was having trouble sanding up, on a daily production of about 26 bbl. of oil. Total depth is 2,048 ft.

In Bienville Parish, R. H. Crow 1 Fred Sutton, 18-17n-6w, was drilling below 6,753 ft. in shale and limestone. Union Producing and Pure Oil Co. 1 Nebo, 30-14n-5w, is now drilling in new hole at 5,930 ft.

Hunt Oil Co. 1 Louisiana Delta, 6-4n-5e, Catahoula Parish, was unchanged. It is shut in at total depth of 10,442 ft. Carter Oil Co. 1 Gandy, 28-19n-7w, Claiborne Parish, was drilling below 9,684 ft.

EASTERN TEXAS

Two New Tests For Cherokee County

DALLAS.—Cherokee County gained two new exploratory tests. H. L. Hunt Oil made location for 1 Lela Tucker, 330 ft. from north and west lines of the lease in the Thomas Quevedo Survey, 1 mile north of Jacksonville in Cherokee County. Contract depth is 5,000 ft. In the northern section, J. V. Scrivner and J. Natt Thompson, Paris, Tex., staked location for their 1 M. O. Stevens, as a 4,000-ft. test. Location is on a 150-acre tract in the Joshua Morgan Survey, in the Georgia Community of Lamar County, and 18 miles northwest of Paris.

In Anderson County, Stanolind Oil & Gas Co. was preparing to spud its 1 B. F. Weekley, 1,300 ft. east of the Blackfoot Pettit limestone discovery. A 1-mile north outpost to the discovery, The Texas Co. 1 Barnard, I. P. Rhinehart Survey, had set casing to 5,420 ft.

Special orders affecting eastern Texas fields were issued by the Texas Railroad Commission last week. In Henderson County, the Tri-Cities field was allowed 933 ft. between wells and 330 ft. from any property lines. Gas-oil ratio is 2,000 cu. ft. per barrel of oil produced; 20-acre proration units; and allowable based 75 per cent on acreage and 25 per cent on number of wells. In the Chapel Hill gas field of Smith County, permission was granted to balance overproduction from month to month; no well to be produced, however, more than twice its regular monthly allowable. In Edwards County, the Wardlay field spacing rule was set at 300 ft. between wells and 150 ft. from any property line.

In Anderson County, Continental Oil Co. 1 Henderson, Lambright Survey, 5 miles southwest of Larue, was drilling below 7,465 ft., and thought to be nearing the Paluxy.

In Smith County, 3 miles west of Lindale, Magnolia Petroleum Co. and Sinclair Prairie Oil Co. 1 Fair was held up for repairs at 10,142 ft. in the Pettit. Top of the Pettit has been tentatively placed between 10,070 and 10,100 ft., on an elevation of 462 ft. Operators reported a core from 10,076 ft. returned 2 ft. of shaly limestone with slight stain and odor of oil. A later core at 10,178-79½ ft. returned 6 in. of hard sand, with slight gas odor. The sand was not identified, but some believed it might be the Travis Peak, giving the well a relatively thin section of the Pettit limestone.

EAST TEXAS WILDCAT FAILURES

Henderson County: Jim Finlayson et al 1 L. A. Avent, Thos. S. Mitchell Sur., 12 mi. N Trinidad, dry, TD 1,302 ft. in shale, sand with slight show of gas 1,230 ft.

Limestone County: O. W. Killam 1 Emma Head, J. Young Sur., 8 mi. SE Kosse, dry, TD 5,120 ft., Austin 3,840-3,920 ft., Georgetown 4,530 ft., by samples, elev. 338 ft.

Milam County: Taylor Refining Co. 1 R. L. Batte, G. M. Gilliland Sur., 2 mi. NE Milano, dry, TD 3,265 ft., reported some 25,000 cu. ft. gas a day, with considerable salt water.

Rains County: Bobby Manziel 1 F. F. Grimes, Kneeland Sur., 8 mi. SW Alba, dry, TD 6,808 ft., Pecan 2,412 ft., Austin 3,705-4,033 ft., Woodbine 4,495 ft., Red Beds 4,530 ft., Paluxy 6,450 ft., by samples, elev. 410 ft.

Wood County: F. R. Jackson 2 First Na-

tional Bank of Quitman, Jane Duncan Sur., 6 mi. E Quitman, dry, TD 5,994 ft., Nacatoch 1,890 ft., Pecan 2,990 ft., base Austin 4,890 ft., sub-Clarksville 4,999-5,075 ft., elev. 455 ft.

Cherokee County: Sun Oil Co. 1 J. & M. Bobbit, J. M. Montez Sur., 5 mi. S Summerfield, dry, TD 4,232 ft., base Austin 4,223 ft., Woodbine 4,225 ft., elev. 408 ft.

CANADIAN FIELDS

Leduc May Get NE Extension

CHATHAM. — East of the Leduc field, Central-Pyrcz 2, LSD 12, 25-50-26w4, contacted the D-2 zone high at 4,825 ft. and got the green shale marker at 4,987 ft., shallower than any other well in the field. A drill-stem test showed a little gas in the D-2 zone, and the hole is deepening to test the D-3 horizon. Production at this point would extend the field to the north and east. Still farther northeast, East Leduc 2, LSD 10, 5-51-25w4, got the Devonian contact at 4,272 ft.

Woodbend.—An important outpost test, Imperial-Woodbend 1, LSD 5, 15-51-26w4, 2½ miles northwest of the Leduc field, is nearing a decisive stage. In the D-1 zone the well got oil showings with a good gas flow and some water. It is coring below 5,064 ft. in the D-2, which seems tight, and will continue down to test the D-3.

Outpost tests.—A number of wildcat tests in north-central Alberta, outlying the Leduc field in various directions, are nearing the critical stage. Due north of the field, Gulf-Stony Plain 1, LSD 14, 9-52-26w4, after unsuccessful tests in lower horizons is swabbing in the D-1 zone at 4,430 ft. North and east of Leduc, Imperial-Legal 1, LSD 8, 18-58-24w4, is below 6,348 ft.

South and west, Imperial-Battle Lake 1, LSD 16, 12-46-3w5, is drilling below 8,369 ft. South and east, McColl-Ashley 2-16 Pipestone Creek, LSD 2, 16-47-25w4, got oil-cut mud in drill-stem test of the D-1 zone at 5,016 ft. and is coring below 5,058 ft. In the Ponoka area, still farther south and east, McColl-Spotted Creek 1, LSD 8, 24-42-24w4, is in D-2 zone at 6,265 ft.

Three other important wildcats are drilling considerably farther west. In the Wabamun Lake area, Wabamun 1, LS5 5, 10-51-4w5, is coring below 6,397 ft. and approaching the D-2 zone, after getting good oil shows in the upper horizons. In the Telfordville area, McColl-Frontenac 15-10, LSD 15, 10-50-2w5, is coring below 5,436 ft. and nearing the Devonian.

Outpost well to the north and west, Muskeg N.F.A. 1, SE 24-57-6w6, is drilling in sand and shale below 7,838 ft.

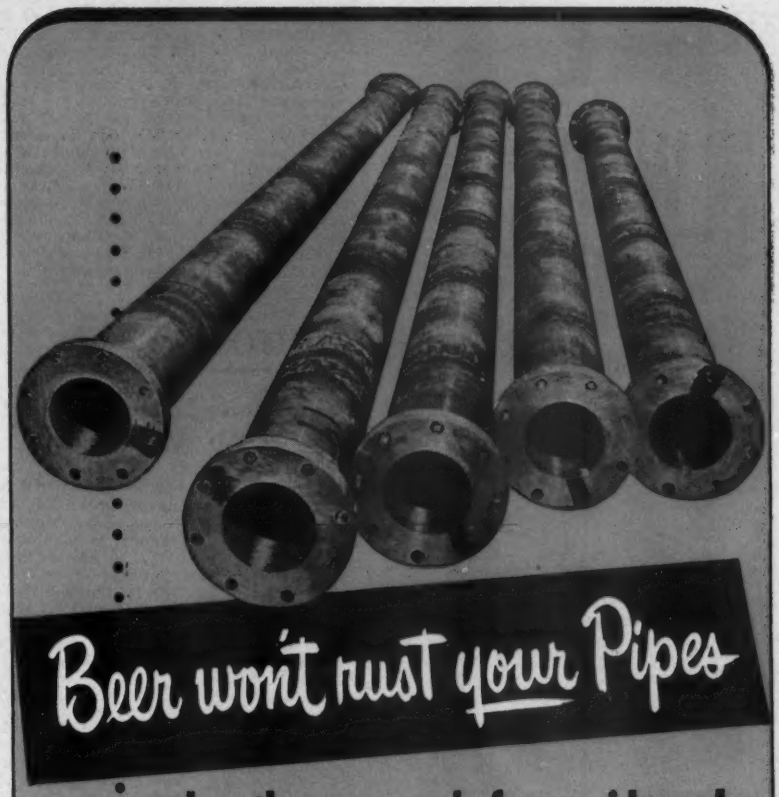
In the Leduc field, Imperial 22, LSD 2, 26-50-26w4, on the east side of the field, finished at 5,345 ft., and has been brought into production in the D-3 zone, giving the company 20 producers, out of a field total of 26 producers.

Imperial 21, LSD 11, 26-50-26w4, finished at 5,314 ft., and a 24-hour test for potential showed 592 bbl. Imperial 20, LSD 8, 34-50-26w4, finished at 5,295 ft., swabbed into production with initial test of 900 bbl. in 16 hours, and is now operating on restricted flow. Imperial 17, LSD 16, 16-50-26w4, at 5,125 ft. is testing after acidizing to increase production. Imperial has six other wells drilling, with two new starts scheduled.

Home-Leduc 1, LSD 11, 21-50-26w4, has set casing and is testing the D-3 zone at 5,345 ft. with production indicated. Atlantic Oils 2, LSD 14, 23-50-26w4, got Devonian contact at 4,340 ft. and is nearing completion. Four other independent wells are drilling, with four locations.

Production of the Leduc field in November totaled 86,665 bbl. or 2,822 bbl. daily from 23 producers. Eight wells were brought in during the month. Production since the field was opened last February totals 272,576 bbl.

Fort Providence.—First serious test of



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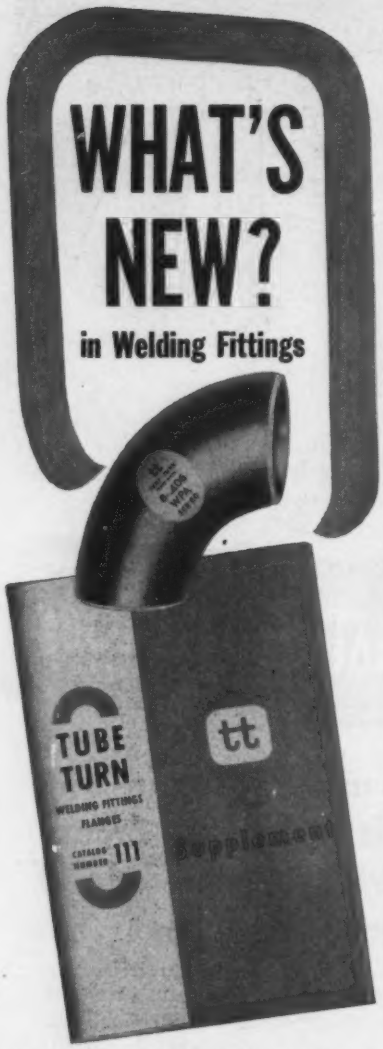

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the Canadian north since the Canol drilling, Slave Lake Oil Syndicate has been organized at Yellowknife, N.W.T., to explore for oil in the Great Slave Lake-Fort Providence areas. The syndicate has staked two oil claims, one of 200 square miles northwest of Caen Lake and another of 100 sq. miles near Fort Providence, where the Mackenzie River leaves the lake; the holdings totaling 192,000 acres. The syndicate is headed by Dr. J. D. Bateman, resident geologist of Giant Yellowknife Gold Mines; A. W. T. Freakes, superintendent of the same company; and L. W. Nelson, northern mining operator.

CALIFORNIA

Schist Zone Looks Good In Arvin-Mt.. View Area

LOS ANGELES.—Pacific Western Oil Corp. definitely has reopened the fractured Schist zone in the Arvin-Mountain View area of Kern County to further exploration with its 53 P. H. Greer, 9-31s-29e. On a 1-hour production test of this zone at the interval 7,250-7,318 ft., the well flowed at the rate of 500 to 750 bbl. daily. Water cut was less than 1 per cent and gravity of the oil was 41°, which is extremely high for this area. Total depth of the hole is 7,323 ft.

Possibilities of the Schist zone yielding oil were determined to be favorable last year when the Western Gulf Oil Co. completed a small discovery well in this formation. Other wells subsequently were drilled but none produced prolifically enough to be commercial wells. The new zone apparently is a fractured schist similar to the Schist zone at Edison. It is understood, however, that there is a small sand body at the top of the zone drilled in the 53 Greer.

Most of the wells drilled at Arvin in the past 18 months have been completed in the Cattini zone at approximately 6,600 ft. and have been good producers. The 53 Greer missed the Cattini entirely, but cored the new formation. It is believed that at least 12 wells in the area are favorably located for schist production and susceptable of being deepened to the new zone. Companies which will be aided by the new find are Pacific Western, North American Consolidated and Western Gulf.

Standard Oil Co. of California late last week completed a test of an upper interval in the upper Eocene formation at its wildcat venture in the Kettleman Hills Middle Dome area, the 73-30V, 30-23s-19e, and is preparing to drill ahead another 75 or 100 ft. for another test. The test just completed gave ample confirmation of a new field discovery even though the sand was hard and tight. Operators are of the opinion that the sand will soften with depth. The well has now been carried to 12,229 ft., and another test is scheduled at 12,280 ft.

Seguro Petroleum Co.'s deep test in the Huntington Beach field, the 1 Seguro, 34-5s-11w, last week encountered a drilling break at a depth of 6,670 ft. and initiated coring operations at that depth. The well currently is being cored ahead below 6,880 ft. and reported to be in hard shale. During the past few weeks the 1 Seguro has drilled through several possible producing oil zones below zones now productive in the field.

CALIFORNIA WILDCAT FAILURES

Kern County, Comanche Point area: Gene Reid Exploration Co. 2 Gould, 33-12n-18w, dry, elev. 855 ft., Santa Margarita 435 ft., Fruitvale shale 870 ft., TD 1,261 ft.

Los Angeles County, Newhall area: Aurora Corp. 2 Braille, 1-3n-16w, dry, elev. 1,325 ft., TD 3,586 ft.

Ventura County, Camarillo area: Warren Oil Co. 1 Janss Inv., 28-2n-21w, dry, elev. 289 ft., TD 3,780 ft., could not recover fish.

ROCKY MOUNTAIN

Montana Gets Best Strike of Year

DENVER.—Montana has a promise of its best discovery of the year in Texas Co. 1 Manion, SE SW SE 55-11n-30e, Ragged Point structure, Musselshell County. After plugging back from 6,312 ft. to 4,612 ft., with the 7-in. at 4,380 ft., it started flowing and made 10 bbl. of 32.5°-gravity oil in 6½ hours. It then swabbed at the rate of 10 bbl. per hour on a 4½-hour test. Subsequently it dropped to 5.3 bbl. of fluid per hour, of which 5 per cent was basic sediment and water. Next step will be to plug back to 4,460 ft. to shut off water, and then shoot and test from that point up.

The production is coming from the Kibby sand in the Quadrant formation, which lies between the Pennsylvanian and the Mississippian, and is widespread in Montana. Top of the Kibby sand was at 4,380 ft., with the 7-in. at that point. The test was from 232 ft. of the formation, and after plugging back, it will still have 80 ft. of sand.

Southeast Elk Basin.—Carter Oil Co. 8 Johnson-Watson, NE SE SW 8-57n-99w, on the southeast side of the Elk Basin field, which already has proven an important extension of the Tensleep horizon, topped the Madison at 6,368 ft., and is coring ahead at 6,502 ft. A drill-stem test at 6,460-6,502 ft. recovered 100 ft. of mud with oil stainings, but no water. The absence of water is considered very encouraging as the drill is still above the section which showed good production in the two Madison wells to the north and in the Wilkins well in Northwest Elk Basin. The drilling of three unit wells to the Madison to outline the productive area in the field preliminary to forming a participating area has been postponed pending the outcome of the Carter well.

South Shoshone discovery.—Continental Oil Co. 1 Unit, SW NE NW 25-50n-105w, is a small discovery in the Embar on the South Shoshone Dome, west of the west rim of the Big Horn basin. It was drilled to 4,842 ft. and encountered water in the Madison. It then plugged back to 3,771 ft., and perforated the Embar at 3,705-60 ft., and after acidizing with 1,000 to 2,500 gal., it made 25 bbl. per day of 18.1°-gravity oil with 1 per cent water on final swab test. It has been shut in until spring when it will be given a pumping test.

Powder River test.—Texas Co. 1 Unit, C NW NE 2-52n-72w, Adon structure, Campbell County, Wyoming, out near the center of the big Powder River Basin, started swabbing from the Converse sand at night, and after a short test shut down until daylight to avoid any risk of fire. It will be numbered as among the most important of the 1947 discoveries in this area.

The top of the Minnelusa (Conserve sand of Lance Creek) is at 8,997 ft. An earlier drill-stem test at 9,006-17 ft. recovered 2,000 ft. of 31°-gravity oil and 3,100 ft. of salt water in 1 hour. Drilling then continued to 9,945 ft., stopping in the Madison, without developing anything additional of importance. The 7-in. was set at 9,090 ft., plugged back depth. The casing was perforated at 9,010-13 ft. at the oil-water contact for a squeeze job. It was then perforated with two holes at 9,005-07 ft. to test water shutoff. After perforating opposite the pay sand, tubing was run, and preparations made for swabbing in.

New operations.—Nineteen new operations were reported, of which 11 were in Colorado, 3 in Wyoming, and 5 in Montana. The Colorado locations included 7 development wells in the Rangely field, and 4 wildcats.

Wyoming has three new operations, 2 in Mush Creek and 1 in the Torchlight field. Montana has 2 in Kevin-Sunburst, and 1 each in Cut Bank, Pondera, and Sixshooter, no wildcats.

Completions.—Twenty-seven wells were

completed, of which 17 were oil wells, 5 gas wells, and 5 dry holes. Seven of the completions were in Colorado, 5 in the Rangely field, and 2 wildcats. Wyoming had 10 completions, of which 8 were oil wells, 2 dry holes. Three of the oil wells were in Salt Creek, 2 in Hamilton, and one each in East Lance Creek, and Horse Creek. Dry holes were in Middle Baxter Basin and 1 wildcat. Montana had six completions (no wildcats) of which 4 were oil wells, and 2 gas wells. Three were in Kevin-Sunburst, and one in Cat Creek and 2 in Bowdoin. Northwest New Mexico had one wildcat failure, 1 gas well in Fulcher Basin, and 2 gas wells in Kutz Canon.

COLORADO WILDCAT FAILURES

Granerous area, Pueblo County: Leon Wandra 1 Neigh, NW NE SE 19-24s-65w, dry, TD 564 ft., elev. 5,778 KB, Dakota 475 ft.

Pagosa, Archuleta County: Holly Oil Co.-Table Mesa Oil Co. 1 Macht, NE SE NE 31-36n-1w, dry, TD 2,014 ft.

WYOMING SUCCESSFUL WILDCAT

South Shoshone, Park County: Continental Oil Co. 1 Unit, SW NE NW 25-50n-105w, TD 4,842 ft., in Madison, water, top Madison 4,150 ft. Plugged back to 3,771 ft., perf. Embar 3,705-60 ft., acidized with 1,000 and 2,500 gal., swabbed 25 bbl. 18.1° oil per day, 1 per cent water and b.s., shut in until spring for pump test. Elev. 6,705 ft.

NORTHWEST NEW MEXICO WILDCAT FAILURE

Chico Creek, McKinley County: Petroleum Products Ref. & Prod. Corp. 1 Lovington, SE NW 22-17n-6w, dry, TD 2,996 ft. Dakota 2,800 ft., Morrison 2,900 ft.

N. CENTRAL TEXAS

Two Good Wildcats For Year's End

WICHITA FALLS.—Wildcats showing for new commercial production included a Palo Pinto limestone test in Baylor County, and a new Mississippian pool, or extension well, in southeastern Throckmorton County. Cities Service Oil Co. reported a completion potential on its 1 B. H. Manning, as flowing 164 bbl. of oil a day from the conglomerate at 5,203-35 ft. The well, 3 miles west of Chico, is on a block of 7,000 acres held solidly by Cities Service.

The Palo Pinto test in Baylor County was G. E. Kadane & Sons 1-A Quizenberry, P. L. Leaman Survey, 2 miles southeast of Rendham, and some 3 miles southwest of the Rendham Palo Pinto field. It topped the Canyon reef section at 3,231 ft., and showed good porosity and oil saturation to 3,243 ft. A 45-minute drill-stem test of that interval recovered some free oil and gas, and 60 ft. of oil-cut mud. Operators then ran electric survey and set casing to 3,123 ft. After drilling the plug, the formation was treated with acid. Potential tests had not been made, but it was estimated good for 75-100 bbl. of oil a day.

In Throckmorton County, Fred M. Manning, Inc. 1-F Parrott, Block 968, TE&L Survey, 1 mile south of the Manning-Atkinson field, topped the Mississippi limestone at 4,518 ft. and drilled to 4,527 ft. A drill-stem test of the section recovered clean oil, but the amount was not specified. Bottom-hole pressure rose to 1,850 psi. in 15 minutes. Operators set casing to 4,518 ft. for completion tests.

Manning's Unit K, R. A. Brown, west offset to the Brown Caddo limestone field, 4 miles northwest of Throckmorton, on completion test flowed 217 bbl. of oil in 24 hours after acid treatment through perforations from 4,454-59 ft. In central Throckmorton County, the same company's 7 McKnight, Block 2, Day Land & Cattle Co. Survey, flowed 210 bbl. of oil a day from 4,057-62 ft., to extend production ½ mile on the east side of the McKnight field. Manning's 8 McKnight, 1-mile northeast outpost to the field, was drilling below 4,013 ft. in shale. Five miles north of Throckmorton, Manning 1 McClusky, Block 264, BBB&C Survey, topped the Caddo at 4,643 ft., and a drill-stem test from 4,643-4,728 ft. recovered 30 ft. of oil-cut mud. A second test, between 4,728-58 ft., recovered 10 ft. of slightly gas-cut mud.

Four miles northwest of Bowie, in Montague County, The Texas Co. 1 D. B. Benson, Section 1, Limestone County School Lands Survey, swabbed the hole dry and loaded with water after treating with 500

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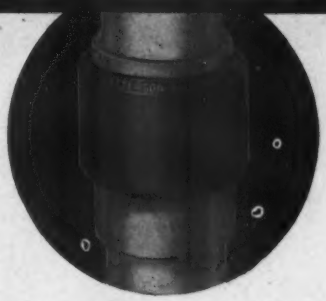
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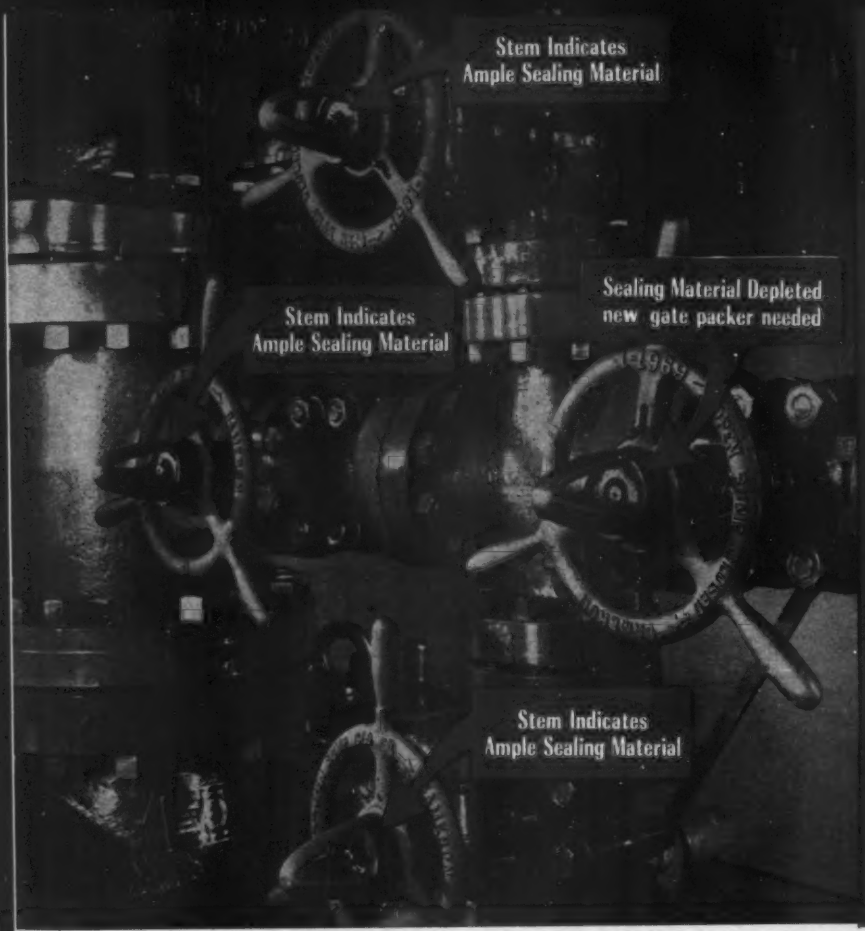

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Left—Note the position of the gate stem when the gate is closed on an unworn flow-way insert. The stem protruding above the stem nut indicates ample reserve of sealing material.
Right—When the flow-way insert is worn away by abrasive fluid, the gate stem will be flush with the top of the stem nut when the gate is in closed position.

gal. of acid between 6,236-44 ft. in the Bend conglomerate. When the swab was run five times, it kicked off and flowed into pits for 30 minutes, after which it flowed 100 bbl. of oil in 1 hour and 5 minutes, and was shue in for connections. Tubing pressure was 110 psi. and casing pressure was 130 psi.

MISSISSIPPI

First Stanley Sand Producer At Soso

JACKSON.—The first producer from the Stanley sand in the Soso field of Jasper-Jones counties, has been completed at Gulf Refining Co. 1 Knight et al Unit, 33-10n-13w, flowing at the rate of 2,641,000 cu. ft. of gas and 19.2 bbl. of 58°-gravity condensate per day through a ¼-in. choke, with tubing pressure 2,050 psi. Gas-condensate ratio is 137,561. Production is through perforations in the Stanley sand at 6,448-6,462 ft. The Christmas sand, regular sand for the field, had gas in the upper 6 ft. but drill-stem tests indicated excessive water and the perforations at 6,629-34 ft. were squeezed.

Pumping equipment has been installed at Hughes and Sistrunk 1 G. M. & O. R. R. Co., 24-9n-8w, in Wayne County, and the first 24-hour pumping test indicated possible production of 350 bbl. of oil per day, however, definite gage has not been reported.

At Ovett, Jones County, Gulf Refining Co. is preparing to set a pumping unit on its 1 L. L. Majors, 29-6n-11w, after failure of all efforts to establish adequate flow. On last flow test, gaged 90.72 bbl. of 31.2°-gravity oil through ¼-in. casing choke with casing pressure 60 psi., tubing pressure 5 psi.

One wildcat start was reported for Greene County, while 5 development locations were reported, 2 in Brookhaven field, Lincoln County, and 3 in Mallalieu field, Lincoln County.

MISSISSIPPI WILDCAT FAILURE

Washington County: C. H. Murphy, Jr., & Sun Oil Co. 1 C. W. Hunter Co., 5-18n-9w, dry, TD 5,555 ft. Elevation 144 DF.

ALABAMA WILDCAT FAILURE

Winston County: Glen D. Rose Oil & Gas Co. 4 First National Bank of Birmingham, C SE NW 5-12s-8w, dry, TD 1,505 ft.

APPALACHIAN FIELD

Raleigh Co., W. Va., Test Tops Corniferous Lime

PITTSBURGH.—In Shady Springs district, Raleigh County, West Virginia, Godfrey L. Cabot, Inc., topped the Corniferous lime at 6,908 ft. in the important wildcat on Russell & Doloff tract. From an elevation of 1,999 ft. this places datum at —4,909 ft. There was a gas pocket at 6,819 ft. which was soon exhausted. Casing is being set at 6,923 ft.

In Kanawha County, Elk district, United Fuel Gas Co. drilled through the Oriskany sand (5,450-78 ft.) in the test on the Payne-Gallatin tract with a final gage of 400,000 cu. ft. at the total depth of 5,521 ft. It will be shot. Same company topped the Corniferous chert at 5,323 ft. in the test No. 6,240 Mary F. Myers, or from an elevation of 1,097 ft. at datum of —4,226 ft., and in the test No. 6,242 W. J. Patterson at 4,969 ft. or datum —4,180 ft.

In Lincoln district, Wayne County, the southwestern part of the state, United Fuel Gas Co. shut down at 5,600 ft. in No. 6,181 F. D. Caldwell to run 7-in. casing. This well is especially interesting as it will test the deeper formations, having logged the Corniferous at 3,105-3,765 ft. and the Big Six gas (now 84,000 cu. ft.) at 3,770 ft.

New locations totaled 10 and in Sherman district, Boone County; Elk and Poca districts, Kanawha County; Harts Creek district, Lincoln County; Grant district, Ritchie County; Washington district, Upshur County; Grant and Lincoln districts, Wayne County; Baileysville district, Wyoming County.

In Georges Township, Fayette County, on Chestnut Ridge, Manufacturers Light & Heat Co. topped the Tully lime at 6,500 ft. in No. 8 Barton, from a surface elevation of 2,598 ft. or datum of plus 3,902 ft. and is running structurally high. In the offset to the Hartman No. 1, a good Oriskany gas well, Orville Eberly et al shut down at 6,920 ft., in or near the Onondaga lime, to run 7-in. casing in No. 1 Albert J. Opperman. This well is running higher than the largest well in the field, No. 1 Smith.

New locations totaled 5 and all were in Armstrong County and in Bethel, Kittanning, Plum Creek and Wayne townships.

WEST VIRGINIA SUCCESSSFUL WILDCATS

Raleigh County, Marsh Fork district: Columbian Carbon Co. 955 Price Davis, 328,000 cu. ft. gas; Maxton sand 2,498-2,587 ft., gas 2,552-56 ft., Big lime 2,781-3,079 ft., Injun sand 3,079-3,115 ft., TD 3,400 ft.

Trap Hill district: Hope Natural Gas Co. 9,175 E. P. Trump, 2,191,000 cu. ft. gas; Maxton sand 2,026 ft., gas 2,032-59 ft., shot, rock pressure 520 psi. 24 hours, TD 2,062 ft.

Wyoming County: Oceana district: Hope Natural Gas Co. 9,139 Perry C. Cook, 1,107,000 cu. ft. gas; Big lime 2,752-3,111 ft., Berea 3,617-56 ft., gas 3,635-45 ft., shot 3,633-49 ft., TD 3,688 ft.

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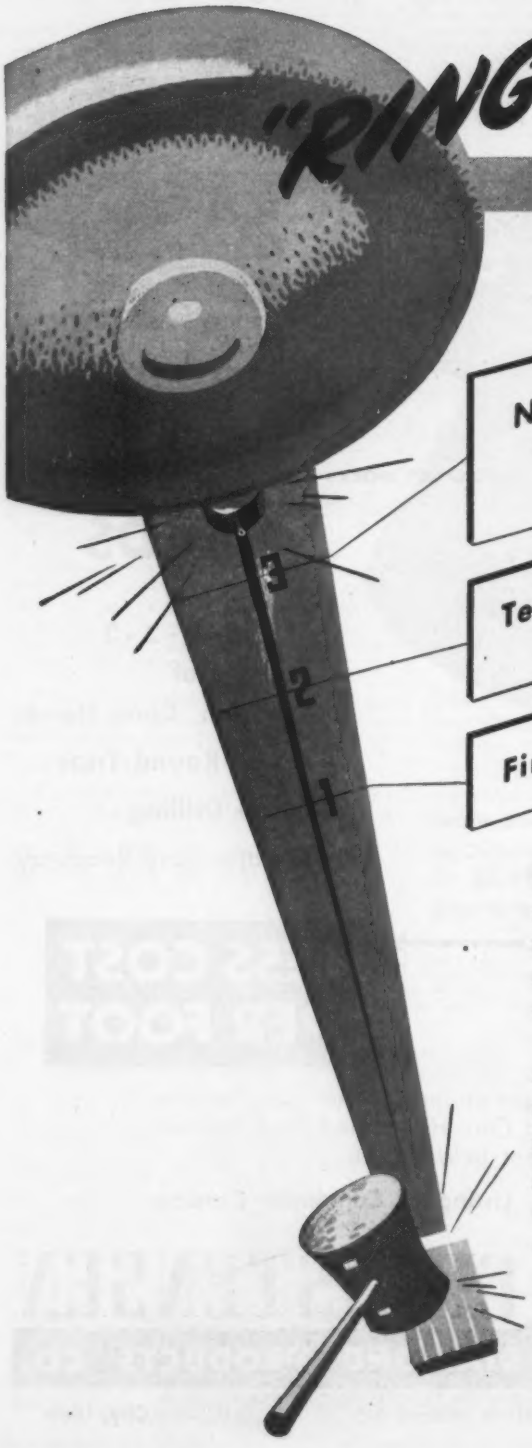

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Technical competence to decontaminate.

Financial responsibility.

BUYER'S QUALIFICATIONS: Each bid must be accompanied by written statements indicating available marketing facilities, technical competence to perform such decontamination as the Government may require, and financial responsibility.

Information on the qualifications of bidders and conditions under which bids will be considered are contained in a special bid form obtainable only at the address given herein. *A considerable portion of these facilities are heavily contaminated with explosives and acids, and must be decontaminated by the purchaser in accordance with ordnance procedure.*

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TO BE SOLD AS UNITS TO *QUALIFIED BUYERS:*

(a) either for their own use, or

(b) for decontamination, dismantlement and resale, in whole or part, to any number of third parties

This is your opportunity to secure, under most favorable conditions, valuable plants, processing units, machinery and equipment which are currently in great demand.

PLANTS & EQUIPMENT INCLUDE:

Production and processing equipment at one or more locations for ammonia oxidation, sulphuric acid concentration, oleum, nitric acid, sellite, solvent recovery, cotton or wood pulp nitration, finished smokeless powder, D.N.T., T.N.T., tetryl, and ammonium picrate.

The properties comprise various acreages of land and abundant auxiliary facilities including in some cases, power plants, substations, rail trackage, switching and shipping equipment, water supply and treatment, maintenance and repair shops, laboratories, storage tanks, administration buildings, warehouses and a variety of other installations.

HOW TO BID

Disposal will be made only by the acceptance of sealed bids which must be made on the forms supplied for that purpose and submitted separately for each property or for groups of two as indicated, before the time given below:

ORDNANCE WORKS	SUBMIT BIDS BEFORE
Kentucky Ordnance Works, Paducah, Ky.	2:00 P. M., E. S. T. February 13, 1948
Oklahoma Ordnance Works, Pryor, Oklahoma	2:00 P. M., E. S. T. February 13, 1948
Weldon Springs Ordnance Works, Weldon Springs, Mo.	2:00 P. M., E. S. T. February 13, 1948
New York Ordnance Wks., Baldwinsville, N. Y. and Lake Ontario Ord. Works, Youngstown, N. Y.	offered jointly 2:00 P. M., E. S. T. March 5, 1948
Gopher Ordnance Works, Rosemont, Minn. and Badger Ordnance Works, Baraboo, Wisc.	offered jointly 2:00 P. M., E. S. T. March 5, 1948
Keystone Ordnance Works, Meadville, Pa.	2:00 P. M., E. S. T. March 5, 1948

CONDITIONS OF SALE: Bids will be received either for purchase for a fixed price, or for a substantial cash payment with the gross receipts from resale to be divided equitably between the purchaser and the Government.

DON'T WAIT... WRITE, WIRE OR PHONE

This advertisement does not constitute an offering. To receive consideration, your bid must comply with the specific bid form for the property you are interested in. Write, wire or phone today, to the address given below for your copy of the bid form and to arrange for inspection of the properties.

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Address all correspondence to: P. O. Box 2707, N. Capitol St. and Massachusetts Ave., N. E., Washington 13, D. C.

WAR ASSETS ADMINISTRATION
OFFICE OF REAL PROPERTY DISPOSAL

PERMIAN BASIN

Coke County Gets Another New Field

MIDLAND.—Sun Oil Co. opened another limestone oil field in northwestern Coke County at its 1 J. B. Walker, C. Brockhuysen Survey 526, 4 miles southwest of the Jameson field. A drill-stem test between 6,230-60 ft., open 15 minutes, brought gas to the surface in 5 minutes and recovered 460 ft. of 44.9°-gravity oil, plus 10 ft. of heavily oil-cut mud. Flowing pressure was 450 psi. Operators set casing at 6,230 ft. and were waiting on cement. On an elevation of 2,029 ft., top of the Reef limestone was 6,114 ft., and top on the crinoidal at 6,123 ft.

Gulf Oil Corp. 20-B-E Connell, Section 26, Block B-16, had flowing Ellenburger production 1 mile northwest of the Jordan Ellenburger field of southern Ector County. A drill-stem test at 8,796-8,821 ft. produced 44 bbl. of 43° oil in 1 hour. At the beginning of the test, it had a strong blow of air, followed by gas in 36 minutes, estimated 700,000 cu. ft. daily, then mud in 70 minutes, with oil 10 minutes later. After cleaning into pits for 5 minutes, the 1-hour oil flow of 44 bbl. was gaged. This well has also indicated production in the Tubb, Silurian, and Waddell pays.

Another Gulf test, 1-A-E Hattie Connell, Crane County test 3½ miles north of the Sand Hills area, had definite prospects of production in the Ellenburger, as well as the Silurian. Earlier drill-stem test results indicated the Waddell pay would also produce.

Slick-Urschel Oil Co.'s southeast Upton County Ellenburger discovery made completion tests this week, flowing at the rate of 888 bbl. of oil a day. Gas-oil ratio was 4,000 cu. ft., and gravity of the oil was 56°. The potential was based on a 10-hour gage through ⅜-in. choke on tubing set at 12,000 ft. The well was drilled to 12,022 ft. after topping the Ellenburger at 11,021 ft. Casing was set to 12,018 ft. and perforated at intervals from 11,885-11,985 ft. The discovery was started in May 1941 by Plymouth Oil Co., and temporarily abandoned a year later at 10,384 ft. in Devonian limestone and chert.

On the north side of the Martin area of southern Andrews County, Humble Oil & Refining Co. 10 Parker, Section 19, Block A-41, rated a calculated daily flowing potential of 791 bbl. of 43°-gravity oil a day, through ¼-in. choke, from perforations between 8,865-8,960 ft. Gas-oil ratio was 140 cu. ft. Humble's 11 Parker, Section 23, Block A-41, on the east side of the same field, recovered some 3,800 ft. of sulfur water, with no shows of oil or gas, on a 1-hour drill-stem test in the Wichita Albany at 7,500-6,611 ft. It was to be drilled deeper.

The third Ellenburger producer for the Dollar Hide field was completed at Magnolia Petroleum Co.'s 6-DD-B E. P. Cowden, in Section 4, Block A-55. The well was bottomed at 10,003 ft. Daily potential was 680 bbl. of 44°-gravity oil a day, flowing through ¼-in. choke, on a gas-oil ratio of 563 cu. ft. It extends production ½ mile south of the area.

Argo Oil Corp. 1 Clyde Ikins, Reeves County test, 8 miles northeast of Saragosa and south of the same company's 1 Dora Roberts, was showing for possible production in the Delaware sand from 6,270-6,382 ft. A 3-hour drill-stem test at that interval recovered 315 ft. of drilling mud, of which the bottom 50 ft. was cut with clear, green oil. It was to be deepened before further testing.

The Midway Lane field of Crockett County received a ¾-mile south extension this week at Shell Oil Co., Inc. 1 Chambers County, located in the Chambers County School Land Survey. While this well was running 99 ft. lower on the Ellenburger than the discovery, a drill-stem test from 7,510-35 ft. brought gas to the surface in 3 minutes, estimated at 1,500,000 cu. ft. daily, and oil flowed at the end of 17 minutes. On a gas-oil ratio of 2,340 cu. ft., it gaged 14 bbl. of 44°-gravity oil in the last 30 minutes of the flow period. Total recovery was not disclosed. Operators plan to deepen. Top of the Ellenburger was 7,490 ft.

In Pecos County, a new location was made by the LaGloria Corp. for a shallow wildcat 11 miles southeast of Fort Stockton. It is the 1 H. L. Winfield, 330 ft. from south and west lines of Section 10, Block 132, T&STL Survey. Proposed depth is 2,800 ft., to be drilled by combination rotary and cable tools.

Location for a 2,500-ft. cable tool wildcat was reported to have been made by Jimmy Mills et al, of Del Rio, Tex., 30 miles northwest of Toyah, northern Culberson County. It will be the 1 J. H. Fisher, 660 ft. from south and 990 ft. from east lines of Section 12, Block 110, PSL Survey. Location is approximately 4 miles southeast of Freeport Sulphur Co.'s 1 E. C. Chandler, a recently staked 2,000-ft. wildcat.

WEST TEXAS SUCCESSFUL WILDCAT

Crockett County: R. B. Phillips 1 Magnolia-Shannon, Sec. 24, Blk. Q, GC&SF Sur., 3 mi. NE Shannon field, pumped 52 bbl. 32°-gravity oil a day, top pay 2,356 ft., TD 2,379 ft.

WEST TEXAS WILDCAT FAILURE

Hockley County: Honolulu Oil Corp. 1 L. C. Hewitt, Lab. 23, Lge. 712, State Capitol lands, 15 mi. NE Levelland, dry, TD 5,065 ft., brown limestone 3,380 ft., San Andres 3,690 ft., elev. 3,440 ft.

TEXAS PANHANDLE WILDCAT FAILURE

Lamb County: Honolulu Oil Corp. 1 Halsell, Lab. 19, Lge. 219, Castro CSL Sur., 5½ mi. NW Sudan, dry, TD 9,138 ft. in pre-Cambrian, San Andres 2,990 ft., Glorietta 4,210 ft., Tubb 5,270 ft., Wolfcamp 5,900 ft., Pennsylvania limestone 7,000 ft., Ellenburger 9,000 ft., Cambrian 9,070 ft., elev. 3,795 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—R. Olsen Oil Co. completed its 1 Wimberly, NE SE 23-25s-37e, as a new pay discovery in the Justice gas area, east of the southern section of Langlie-Mattix, in Lea County. Initial production was 25

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (b) and (c). The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 59, U.S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form.

Annual rental will be at the rate of 25 cents per acre so long as the land is valuable only for gas; but upon discovery of a valuable deposit of oil within the boundaries of the known geologic structure on which all or a part of these lands are situated annual rental will be not less than $1 per acre. The lands are in the Bowdoin Dome Field, P. M., Montana, and are offered in the following parcels: All in T. 33 N., R. 31 E., Parcel No. 1, sec. 22, lots 4 and 8, 19.08 acres. Parcel No. 2, sec. 26, lots 2, 4, 5, 6, 9, SE¼SE¼, 203.53 acres. Parcel No. 3, sec. 29, lots 2, 6, 7, 8, 10, 131.21 acres. Parcel No. 4, sec. 29, N½NE¼, SW¼NE¼, NW¼, 280 acres. Parcel No. 5, sec. 32, all, 640 acres. Total 1273.82 acres. Bids must be submitted on or before 1 p.m., January 21, 1948, and must be submitted on each parcel separately but no objection will be made to the award of more than one parcel to the same successful bidder. Fred W. Johnson, Director.

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Employees still want the benefits of the Payroll Savings Plan. In fact, they *need* the P. S. P., because banks don't sell Bonds on the "installment plan"—which is the way most workers prefer to buy them. But wartime emotional appeals are gone. Human nature being what it is, the success of the Plan in your company is liable to dwindle unless a responsible executive keeps it *advertised*. The *reasons* for promoting it are as important as ever—to you, your company, and your country.

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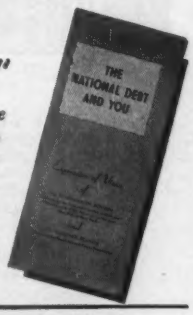
a 12-page pocket-size brochure, expresses the views of W. Randolph Burgess, Vice Chairman of the Board of the National City Bank of New York, and Clarence Francis, Chairman of the Board, General Foods Corporation. Request your copy from the Treasury Department's State Director, Savings Bonds Division.



The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

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bbl. of distillate and 2,820,000 cu. ft. of gas a day, from the Glorietta at 4,740 ft. The well was drilled to 9,152 ft., in dolomite, and plugged back to 4,780 ft. for completion. Perforations between 4,815-45 ft. were acidized and it flowed at the rate of 3 bbl. of oil an hour. When shut in overnight, it filled up 1,000 ft. with oil. Operators reacidized and swabbed down to 3,500 ft. off bottom when salt water broke in. It was then plugged back to 4,780 ft., and perforated between 4,740-70 ft. On potential test it was still making some salt water with the distillate.

TEXAS GULF COAST

Columbus Field Gets New Pay and North Extension

HOUSTON.—A new oil sand for Columbus field, Colorado County, has been opened by Pan American Production Co. 1 Ola Buescher. This well also extends the field 5,000 ft. north, being located in James Cummins Survey. On potential test it flowed 68 bbl. of oil per day through an 8/64-in. choke, gravity 45.9°. Total depth is 9,365 ft., and production is through perforations at 8,375-85 ft.

Humble Oil & Refining Co. 2 George D. Vick et al, a wildcat, in the Tanglewood area of Lee County, Bethel Smith One-third League, flowed 236 bbl. of fluid per day through a 3/8-in. choke along with 1,420,000 cu. ft. of gas and showed 28 per cent salt water. This is from the Georgetown lime, open hole from 6,111-19 ft. On a previous test this well flowed 44 bbl. of oil per day through a 1/2-in. choke, 269,000 cu. ft. gas per day. Operators are still testing.

At Cold Spring field in San Jacinto County, Butcher-Arthur, Inc. 5-D Foster Lumber Co., in George Taylor Survey, flowed a potential gage of 108 bbl. of 41.8°-gravity oil in 24 hours through a 9/64-in. choke with 400 psi. flowing pressure on tubing and no water in the flow. Total depth is 4,435 ft., with saturated sands from 4,425-35 ft. Production is through perforations at 4,430-33½ ft.

In the Blue Basin area of Wharton County, Johnston & Johnston 1 Frenn, ¼ mile northeast of The Texas Co. 1 Duffy gasser, in Jos. Hyland Survey, has been completed with gage of 1,726,000 cu. ft. of gas per day through a 7/8-in. choke with 2,150 psi. flowing pressure on tubing and 2,180 psi. casing pressure. Total depth is 5,726 ft., and 5½-in. casing is set at 5,719 ft.

Standard Oil Co. of Texas 1 J. S. Peters et al, in Gist field, Newton County, is extending this field 2,150 ft. southwestward. Total depth is 7,255 ft. and 7-in. casing has been set at 7,253 ft. Test was made in the Hartberg sand at 7,169-72 ft., and it flowed at the rate of 72 bbl. of condensate per day along with 3,300,000 cu. ft. of gas per day. Should this well be completed in the 7,100 zone, it will assure the field of three producing zones. The 1 Hankamer was completed at 5,900 ft., while the 1 Hartberg was finaled at 5,600 ft. after flowing some gas and condensate from below 7,000 ft.

There were 36 new locations reported this week with 14 being wildcat starts, 3 in Refugio, 2 each in Calhoun and Victoria, and 1 each in Bee, Chambers, Gonzales, Lee, Liberty, Wharton and Wilson counties. Two successful exploratory tests were completed this week to open new gas pay in Matagorda Bay field in Calhoun County, and a new oil pay in Columbus field, Colorado County, while six wildcats were dry, two in Fort Bend and one each in Calhoun, Chambers, Gonzales and Orange counties.

TEXAS GULF COAST SUCCESSFUL WILDCATS

Calhoun County: New gas pay Matagorda Bay—Stanolind 1 State of Texas tr. 104, in Tract 14, in Matagorda Bay, 5¼ miles north of Port O'Connor and 1⅛ miles north-northwest of discovery well at Matagorda Bay field, top pay 5,031 ft., TD 5,657 ft., perf. 5,044-49 ft., IP 2,670,000 cu. ft. gas per day through ¼-in. choke, TP 2,000 psi., shut-in pressure 2,050 psi., no water.

Colorado County: New oil pay, and northeast extension, Columbus field—Pan American Prod. Co. 1 Ola Buescher, in Jas. Cummins Sur., TD 9,365 ft., top sand 8,375 ft., perf. 8,475--85 ft., IP 68 bbl. oil per day through 8/64-in. choke, gas-oil ratio 6,535 cu. ft., TP 1,500 psi., gravity 45.9°, no water.

TEXAS GULF COAST WILDCAT FAILURES

Calhoun County: Salt Dome Oil Corp. 1 State tr. 87, in Matagorda Bay, approximately 1¾ miles west-northwest of discovery oil well at Matagorda Bay field, dry, TD 5,618 ft.

Chambers County: Humble Oil & Ref. Co. 8-96 State-Cedar Point, in Section 96, 1 mile east of Cedar Point production, dry, TD 9,036 ft.

Fort Bend County: John H. Blaffer et al 1 J. G. Leveridge, in Jos. M. McCormick Sur., 3 miles northwest of Kendleton townsite, dry, TD 7,530 ft.

Starr Oil Co. 1 R. H. Darst, in Eliz. Powell Sur., 2 miles south of Kendleton townsite, dry, TD 5,501 ft.

Gonzales County: Continental Oil Co. 1

LEGAL

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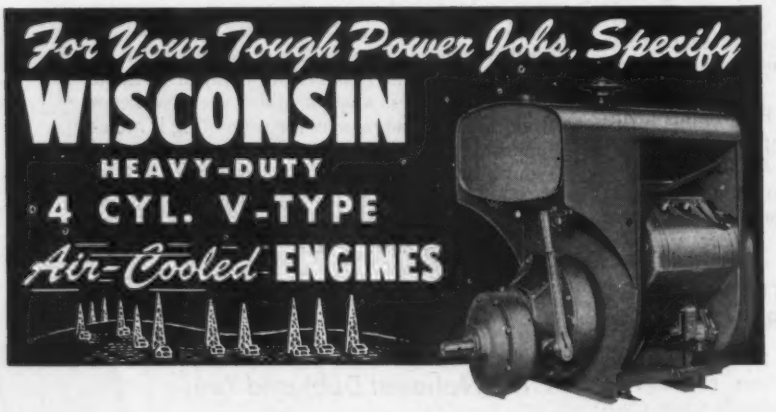
Annual rental will be at the rate of $1 per acre. The lands are in the Salt Creek Field 6th P. M., Wyoming, and are offered in the following parcels: T. 39 N., R. 79 W., Parcel No. 1, sec. 4, lots 1, 2, 3, SE¼NW¼, S½NE¼, 238.38 acres. Parcel No. 2, sec. 4, NE¼SW¼, SE¼, 200 acres. Parcel No. 3, sec. 14, N½SE¼, 80 acres. Parcel No. 4, sec. 24, S½NE¼, NE¼NW¼, NE¼SE¼, 160 acres. T. 40 N., R. 79 W., Parcel No. 5, sec. 1, S½, 320 acres. Parcel No. 6, sec. 2 SE¼, 160 acres. Parcel No. 7, sec. 33, W½NE¼, E½SW¼, W½SE¼, SE¼SE¼, 280 acres. Total 1438.38 acres. Bids must be submitted on or before 1 p.m., January 22, 1948, and must be submitted on each parcel separately but no objection will be made to the award of more than one parcel to the same successful bidder. Fred W Johnson, Director.



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J. B. Robinson, in James Tumlinson Sur. 10, 5½ miles SE of Waelder, dry, TD 5,649 ft.

Orange County: Jack W. Frazier et al 1 Marrs McLean, in Fred Stoever Sur., 3 miles N of Vidor townsite, dry, TD 7,515 ft.

SOUTHWEST TEXAS

Successful Test NE Of Luling Field

CORPUS CHRISTI.—Wiegand Bros. 2 Sonnie Punch, wildcat discovery well in Caldwell County, just northeast of the northeast end of Luling field, and 7 miles north of Luling townsite, is testing approximately 25 bbl. of oil per day on the pump through open hole at 1,774-2,170 ft. This well is located in Guadalupe College Survey. Operators are continuing to test.

Extension well on the east flank of Agua Dulce field, Nueces County, J. M. Flaitz 1 Balzer, gaged 3 bbl. of oil per hour on preliminary test through 5/64-in. choke, with 1,040 psi. tubing pressure, through perforations at 7,305-08 ft. Total depth is 7,425 ft. with 5½-in. casing at 7,367 ft. This well extends production in this pay zone approximately 1 mile north-northeastward along the east flank of the big Agua Dulce structure, and lies a half mile east of gas-condensate production, being in the southeast corner of Section 79, Geo. H. Paul's subdivision of Driscoll Ranch.

Fred M. Manning 1 Ross-Singleton, wildcat approximately 3 miles north of Mathis, in western San Patricio County, is drilling ahead below 4,232 ft. after drill-stem test at 2,756-61 ft. flowed dry gas. This test is scheduled to be drilled to a depth of 5,200 ft.

Osborn & Mid-Continent 2 John Clopton, shallow wildcat test in southern Starr County, 7 miles southeast of Rio Grande City, flowed a small gas volume on ¼-in. choke from a shallow sand perforated at the 650-ft. level, with 140 psi. working pressure and 280 psi. shut-in pressure. Previous test through perforations at 3,852-ft. level flowed a small volume of gas under high pressure, and was squeezed. Total depth is 4,006 ft.

Tom Graham 80 Rosa V. de Benavides, deepening job in an old Houston Oil Co. well originally completed above 2,400 ft. in the West Cole field of Webb County, on Block 3, Survey 412, flowed an estimated 60 bbl. of oil per day on preliminary test through 9/64-in. choke, with 600 psi. tubing pressure, from lower Yegua sand at 2,925-39 ft. The lower Yegua sands heretofore have produced only gas in this field. Rig has been skidded 595 ft. east to the 59 Benavides to deepen that well to the same sand.

Twenty new locations were reported this week with 9 being new wildcat starts, 3 in Duval, 2 in Jim Hogg and 1 each in Brooks, Jim Wells, Webb and Zapata counties. Four wildcats were completed dry, 1 each in Brooks, Starr, Travis and Webb counties.

SOUTHWEST TEXAS WILDCAT FAILURES

Brooks County: H. R. Smith & W. C. McBride, Inc., 1 Prospero Mangel, in La Encantada grant, 7 miles west of Rachal, dry, TD 7,214 ft.

Starr County: Sun Oil Co. 1-A Homer P. Lee, in North Rincon area, in CCSD&RGNG Sur. 517, dry, TD 6,504 ft.

Travis County: Car-Nel Oil Co. 1 Luther G. Lundgren, in Lemuel Kimbro Survey, 6 miles east of Manor, dry, TD 803 ft.

Webb County: Dulaney Oil Co. 3 J. G. Garcia, in Los Ajuelos grant, 5 miles south of Oilton, dry, TD 1,862 ft.

SOUTH LOUISIANA

Egan Field Gets Gas Extension

NEW ORLEANS.—Atlantic Refining Co. 1 H. Dommert, wildcat extension test ¾ mile west of production in the Egan field, Acadia Parish, 29-9s-3w, flowed an ungaged amount of gas and was shut in. Production is through perforations at 10,664-684 ft., in the Hayes sand. Total depth is 10,896 ft.

Humble Oil & Refining Co. 1 State-Calcasieu Lake, Lease 1256, in Cameron Parish, failed on a second test and hole is standing cemented. On a record depth try, perforations at 13,993-14,002 ft., the well recovered 1,350 ft. of gas-cut mud with good pressures. Perforations were squeezed and new perforations made from 13,670-678 ft. A drill-stem test of these perforations recovered mud and 10,129 ft. of salt water. Total depth is 14,024 ft. with 7-in. casing cemented at 14,018 ft.

The Texas Co. 1 State-Willow Bayou on Lease 790, a wildcat in Sabine Lake of Cameron Parish, made an initial test through perforations at 9,608-24 ft., no details were released as to recoveries, and a second test is being made with perforations at 8,758-8,806 ft.

Gulf Refining Co. 1 Cleobule Hernandez et al, a wildcat 4 miles southeast of the Duson field discovery in Lafayette Parish, is making an initial test for production below 12,000 ft. Total depth is 12,950 ft. Production pipe is cemented at 12,198 ft., and perforations are at 12,084-090 ft.

Superior Oil Co. of California 1-A Gulf of Mexico on State Lease 884, Block 71, 19

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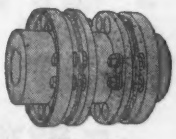
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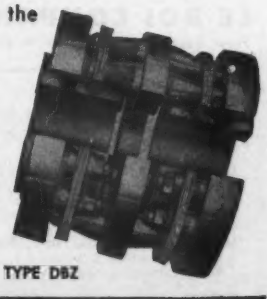
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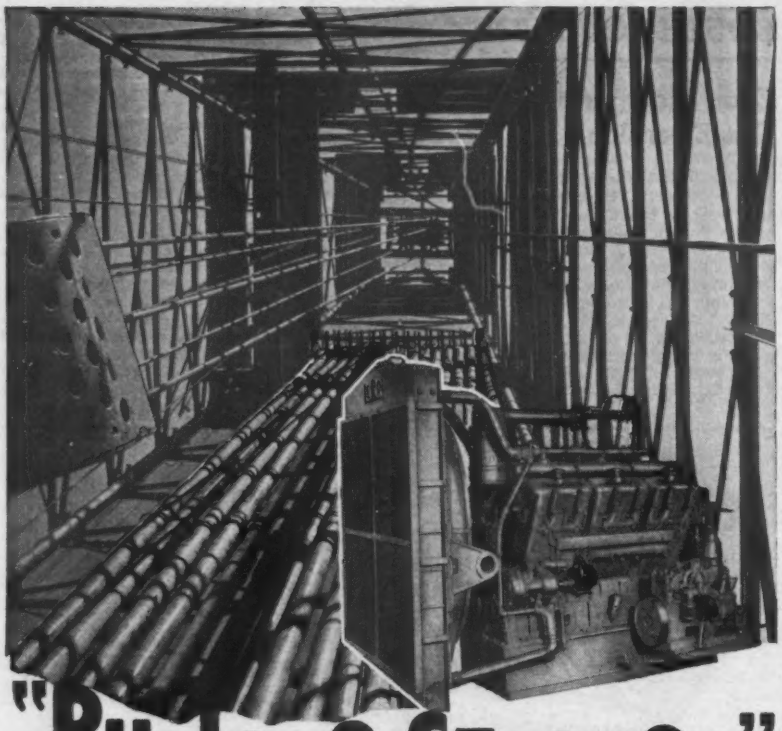

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miles off Vermilion Parish shore, in the Gulf of Mexico, has been completed as dry. This well was drilled to a record depth of 13,628 ft. where an electric log was run with no shows indicated. The 7-in. pipe is being cut out.

There were 24 new locations reported this week with 5 being wildcat starts, 1 each in Iberia, Jefferson, Jefferson Davis, Orleans, and Terrebonne parishes. Seven oil wells were completed and 1 gas well, all in proven areas, while 3 tests were dry.

OHIO, KENTUCKY

Another North Extension For Clayton Pool

COLUMBUS.—National Gas & Oil 4 John Melick, Sec. 31, Madison Township, Perry County, a second recent north extension to the Clayton pool, made 50 bbl. in 24 hours after shot. The Clinton sand was logged at 3,172-3,208 ft.

In the Corning Grade area Pure Oil ? Edward Hickey, Lot 5, Hanover Township, Licking County, showed 24 bbl. natural from the Clinton at 2,942-93 ft. After shot, the well made 127 bbl. the first day.

The Wiser Oil moved ⅝ mile east of their recent wildcat failure in Northampton, Summit County, for a second test, on J. G. McCready, Lot 73. Red Clinton at 3,565-3,620 ft. gaged 126,000 cu. ft. and a show of oil. The underlying white Clinton at 3,623-35 ft. was dry. In 1 hour after shot a gage of 375,000 cu. ft. was recorded.

Three wildcats, all a number of miles from any production, have been located in the North field. East Ohio Gas 1 C. Kirkhart, Lot 72, Stow Township, Summit County, has not yet been started; Benedum-Trees 1 M. Celizic, Lot 23, Leroy Township, Lake County, is drilling past 2,500 ft.; M. P. Belden et al 1 East Brimfield Community, Lot 12, Brimfield Township, Portage County, is past the 2,400-ft. mark.

Locations and completions were both off for the week. Ashland, Muskingum, and Perry counties each reported three locations, while Meigs County reported two and Knox County one. Lancaster field led in completions with 5 out of a total of 19.

WESTERN KENTUCKY

OWENSBORO.—A. J. Slagter, Jr. 1 Alvey, 25-P-19, 3 miles west of Uniontown field, Union County, has been put on pump to test Palestine sand at 2,009-29 ft., Total depth is 3,063 ft.

R. W. O'Meara 2 N. J. Waller, Wabash Island, Union County, is currently drilling below surface pipe.

Ashland Oil & Refining, Basin, and Yunker 1 Crafton, 9-O-24, outpost to Anthoston pool, Henderson County, has moved in cable tools to test Tar Springs at 1,672-91 ft. This test recovered 110 ft. of mud-cut oil on 1½ hour drill-stem test of Tar Springs at 1,662-92 ft.

INDIANA

EVANSVILLE.—Walter Duncan 1 J. O. Allen Community, ⅜ mile north outpost to St. Wendel pool, has taken favorable drill-stem test in Cypress sand. Duncan's well, located in SW NW NW 6-5s-11w, Vanderburgh County, recovered 800 ft. oil on test at 2,287-92 ft.

George S. Engle and Indiana Farm Bureau 1 A. C. Helfrich, NE SW SE 18-6s-11w, wildcat 3 miles west of Evansville, Vanderburgh County, swabbed 10 bbl. of oil per hour from Waltersburg sand at 1,860-76 ft. without being shot. Test is 2 miles from other production and on general trend between Heusler Dome and Evansville pools.

OKLAHOMA

Stanolind May Have World's Deepest Producer

STANOLIND OIL & GAS CO. may have the world's deepest producing oil well at its 1 Briscoe Unit, C NW SW 4-4n-5w, Grady County, near Bradley. With hole bottomed at 14,238 ft. in McLish sand and casing set at 13,678 ft., well flowed 18 bbl. of oil per hour. Packer is set in base of casing and flow is through ½-in. choke on bottom and ¾-in. top choke. Stanolind will test 10 days before deciding whether or not to drill deeper to hit the Oil Creek sand. A core taken at 13,903-29 ft. prior to the drill-stem test was the "best-looking" core in well to date which indicates that the world's depth record may be broken. Present deepest completed producer is Texas Co. 1 Lafourche Basin, Queen's Island, Jefferson Parish, southern Louisiana. Total depth is 15,523 ft., but hole was plugged back and casing perforated at 13,879-904 ft. Company officials say Stanolind is not making any claim at this time that the well establishes a new producing depth record.

Portable Drilling Co. and Deep Rock Oil Corp. 1 G. A. Cooper, southeast outpost to newly-opened West Shawnee Lake oil pool, is the last remaining active drilling operation and future activity in the pool will be determined by its success or failure. This well, located in NW SW SE 17-10n-14e, Pottawatomie County, is below 5,970 ft. in dolomite. Dry holes have been completed to date at three corners of the small pool. Latest failure is Mid-Continent Petroleum Corp. 1 Johnson, SE NW SW 17-10n-4e.

Carter Oil Co. 1 Tilghman, C SW NE 7-4n-3w, East Lindsay pool, Garvin County, on its sixth drill-stem test in Simpson has proven another 47 ft. of pay. Test was made at 9,978-10,025 ft. with tool open 40 minutes. Gas came in 15 minutes for estimated 8,000 M.c.f. daily with light spray of yellow distillate. Test recovered 900 ft. of 45-gravity oil. Bottom hole flow pressure was 4,000 psi. with shut-in pressure of 4,400 psi. in 25 minutes.

Superior Oil Co. 1 Harris, deep workover in Northeast Lindsay pool, McClain County, made 145 bbl. of oil and 1,000 M.c.f. of gas daily on 27-hour flow test of Hunton at 9,470-89 ft. Well, located in NE NE NW 26-5n-4w, has an old total depth of 10,901 and has been drilled ahead to 11,581 ft. in McLish sand.

Sinclair-Prairie 1 Todd, NW SE NW 23-3n-2w, Garvin County, has extended Southeast Antioch pool to the west. On 30-minute drill-stem test at 5,431-68 ft., using 37-ft. anchor and 540 ft. of water load, gas came in 6 minutes, water load in 10 minutes, and oil flowed in 19 minutes at estimated 30 bbl. per hour. With ½-in. bottom hole choke and ⅝-in. top choke, well had surface pressure of 300 psi. at end of test and flow pressure varied from 1,200-1,500 psi. on bottom.

Fox and Fox 2 Gibson, NE SE SW 8-17n-2e, Payne County, has hit pay to add the second producer to Northeast Goodnight pool. Test is making 45-50 bbl. of oil daily and 2,500 M.c.f. of gas through ½-in. choke from total depth of 4,244 ft. with 7-in. casing set at 4,231 ft.

Drilling activity is high in old Sholem Alechem field of Stephens County with three pay zones proven in Springer series. Atlantic Refining Co. 5 Taylor, NW NW NW 12-1s-4w, recovered 10 ft. of oil and 80 ft. of oil-cut mud on drill-stem test at 4,820-910 ft. On test, Magnolia 5 Hanson, NW NE NW 12-1s-4w, flowed 177 bbl. of oil while running tubing, then flowed 67 bbl. in 4 hours through tubing with gas-oil ratio of 4,800 to 1. Atlantic 1 Pierce, NE SE SE 2-1s-4w has set 7-in. casing at 4,739 ft.

Cotton County again led the state in new locations with 10 of state's total of 57. Other leaders were Seminole, Okfuskee, and Garvin with 7, 6, and 5, respectively. Cotton was also outstanding in completions with 20 recorded, including 8 oilers and 12 dry holes. Carter, Seminole, and Hughes followed in that order with 12, 8, and 6.

OKLAHOMA SUCCESSFUL WILDCATS

Carter County: New depth in Scholem Alechem — Gra-Okla. 2 Putnam, NW NW SW 30-1s-3w, pumped 30 bbl. of 29°-gravity oil from Deese at 3,310-30 ft., TD 5,736 ft.

Garvin County: Extension to East Lindsay—Bauman 1 Hinkle, C NW SW 6-4n-3w, flowed 20 bbl. of 44°-gravity oil from Deese at 9,983-10,043 ft., TD 10,217 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Stanolind 1 Feagen, SE SE SW 29-2s-3w, dry, TD 6,963 ft., no shows, no tops reported.

Choctaw County: Potter 1 Ellis, NW NW NE 31-5s-16e, dry, TD 3,55 ft., Jackfork 740 ft.

Cotton County: Hassell 1 Rich, NW NE SW 35-2s-13w, dry, TD 1,907 ft., lime 1,850 ft.

Russell 1 Harper, SW SW SW 2-3s-11w, dry, TD 2,010 ft., conglomerate 1,263-71 ft., lime 1,388-91 ft., sands 1,491-1,517 ft., 1,520-36 ft. and 1,805-14 ft., Mcgargle lime 1,882-87 ft.

Crabtree 1 Pendergraft, NE SE SE 33-3s-12w, dry, TD 1,827 ft., no tops reported.

Ward 1 Underwood, NE SE SE 30-4s-12w, dry, TD 2,670 ft., no shows, no tops reported.

Jefferson County: Kingwood 1 Austin National Bank, C SW SW 28-4s-5w, dry, TD 5,637 ft., Hoxbar 2,337 ft., Deese 4,805 ft., Millsap 5,078 ft., detrital 5,387 ft., lower McLish 5,528 ft.

Loffland 1 Nash, NE NW SW 26-6s-7w, dry, TD 2,512 ft., no shows, no tops reported.

Lincoln County: Flynn 1 Grant, SW SE NE 21-17n-2e, dry, TD 4,792 ft., Checkerboard 3,537 ft., conglomerate 3,569 ft., Oswego 3,980 ft., lime 4,070 ft., Prue 4,108-40 ft., Verdigris 4,197 ft., Red Fork 4,240 ft., Mississippi lime 4,440 ft., Woodford 4,507 ft., Misener 4,546 ft., Hunton 4,547 ft., Sylvan 4,627 ft., Viola 4,712 ft., dense 4,745-54 ft., dolomite 4,754 ft. with slight stain of oil, Wilcox 4,788 ft.

Logan County: National Associated 1 Lary, NW NW NE 34-16n-1w, dry, TD 5,884 ft., Checkerboard 4,389 ft., lime 4,568 ft., Oswego 5,007 ft., Bartlesville 5,270 ft., Mississippi lime 5,336 ft., Woodford 5,375 ft., Hunton 5,456 ft., Sylvan 5,510 ft., Viola 5,602 ft., dense 5,634 ft., Wilcox 5,753 ft., second Wilcox 5,862 ft.

Harper 1 Hancock, C NW SE 21-16n-4w, dry, TD 6,842 ft., no tops reported.

McCurtain County: Jordan 1 Hartline, SW SE SE 2-7s-21e, dry, tight hole, no TD or tops released.

Oklahoma County: Otstot 1 Martin, NE NW SW 24-13n-1w, dry, TD 6,232 ft., conglomerate 5,071 ft., Oswego 5,408 ft., Woodford chat 5,782 ft., Hunton-Bois d'Arc 5,815 ft., Sylvan 5,909 ft., Viola 6,020 ft., Wilcox 6,115 ft., second Wilcox 6,215 ft.

Okmulgee County: White Eagle 1 Spears, SW NE NW 32-14n-11e, dry, TD 3,168 ft., shale 3,040 ft., Viola 3,115 ft., Wilcox 3,164 ft.

Payne County: McMahon 1 Maryott, NE NE SE 6-17n-1e, dry, TD 5,400 ft., Deer Creek 1,912 ft., Avant 3,110 ft., Dewey 3,235 ft., Hogshooter 3,780 ft., Checkerboard 4,090 ft., Big Lime 4,435 ft., Oswego 4,504-60 ft., Verdigris 4,600 ft., Inola 4,723 ft., sand 4,803 ft., Mississippi lime 4,838 ft., Woodford 5,058 ft., Misener 5,115 ft., Hunton 5,125 ft., Sylvan 5,148 ft., Viola 5,232 ft., dense 5,265 ft., dolomite 5,282 ft., Wilcox 5,335 ft., second Wilcox 5,362 ft.

Pottamatomie County: Jackson 1-A Rose, SE SW NE 26-11n-2e, dry, TD 5,881 ft., upper Pawhuska 1,980 ft., lower Pawhuska 2,112 ft., Avant 3,318 ft., Dewey 3,404 ft., Hogshooter 3,545 ft., Layton 3,585 ft., Checkerboard 4,092 ft., Big lime 4,837 ft., Oswego 4,900 ft., Prue 4,930 ft., Verdigris 4,96 ft., Earlsboro sand 5,110 ft., brown lime 5,287 ft., Mississippi lime 5,345 ft., Woodford 5,485 ft., Hunton 5,600 ft., Sylvan 5,646 ft., Viola 5,742 ft., Wilcox 5,860 ft.

Seminole County: Douglas 1 Baker, SW NW SW 28-10n-6e, dry, TD 3,459 ft., Earlsboro sand 3,378-90 ft. with stain and odor of oil, shaly sand 3,390-96 ft.

Emrick 1 Collier, NW SW NW 15-6n-7e, dry, TD 3,161 ft., Cromwell 3,157-61 ft., white sand 3,157-61 ft.

Stephens County: Crosbie 1 Rainey, SW NE NW 13-1s-5w, dry, TD 9,284 ft., no tops reported.

ILLINOIS

Phillips Wildcat Shut In to Await Tankage

MATTOON. — Phillips Petroleum Co. 1 Book, wildcat 5 miles south of Fairfield in NW SE SW 31-3s-8e, Wayne County, has been shut in to await tankage. On latest test this well made 147 bbl. of oil and 56 of water in 20 hours by swabbing and flowing. Test is 1 mile from other production.

Indiana Farm Bureau and C. E. Brehm 2 J. W. Oliver, SW NE NE 29-7s-8e, Gallatin County, 3 miles west of Omaha, flowed 85 bbl. per day by heads after 30-qt. shot of Waltersburg sand at 2,118-29 ft.

Indiana Farm Bureau and B. M. Heath 1 Austin Heirs, wildcat in SW SE NW 32-6s-9e, White County, made estimated 40 bbl. of oil and 3 bbl. water daily on pump test of Bridgeport sand at 1,915-45 ft.

MICHIGAN

Possible New Pool For Arenac County

SAGINAW.—A possible new field in Arenac County, the second for Deep River Township, may have been discovered by Don Rayburn 1 Goodnoe, SE NE SE 18-19n-4e, 2 miles south of the Deep River field discovery well. The well swabbed 30 bbl. of oil from 2,782-98 ft. in the Dundee. Top of the Dundee was logged at 2,771 ft.

Pinconning is becoming increasingly active. The recent successful completion of Swan-King Oil 1 Amyotte et al paces the drilling program in the field. Shell Oil Co., Inc., is drilling a southwest offset to the Swan-King well, and Ervin Major has begun operations on the 1 Bis, a direct 10-acre offset to the Amyotte.

Sohio Petroleum & Americrude Oil Co. 1 Shaw, 7-19n-11w, recovered 150 ft. of free oil in the "Reed City" horizon at 3,444-52 ft. after acidizing, but failed to promise any commercial production, and will be deepened.

There were 12 new starts during the week, including 2 wildcats. Ohio Oil Co. will drill a test in Section 8-18n-14w, Allegan County, and Sewage Sanitation Co. will explore in Section 2-7s-17w, Berrien County. Field locations included: Kaw, 3; Bentley, 2; Rosebush, 1; Arbela, 2; Kimball Lake, 1; Pinconning, 1.

Musgrove Buys Williams' Interests

Musgrove Petroleum Corp. has purchased the Trapp field interests of R. L. Williams, Wichita, for $200,000 cash, according to Pierce C. Musgrove, Wichita independent.

L.P.G. Sales Gain 30 Per Cent

(Continued from page 39)

L.P.G. to satisfy their industrial fuel requirements during the winter months when the heating load demand experienced by the gas companies exceed their gas manufacturing or transmission capacities and forces curtailment of gas supplied to industrial customers. The industrial use of L.P.G. for 1947 is estimated as 285,000,000 gal., an increase of 11.6 per cent over the consumption for the same use in 1946.

Utility Use Continues to Rocket

The use of L.P.G. by utilities is estimated to have increased 55.8 per cent in 1947 over the previous year's consumption. The greater portion of this increase is attributable to the larger utility companies who are using L.P.G. to a limited extent continuously through the year to offset a shortage in supply of either manufactured or natural gas. Their principal demands have been to fill large numbers of 30,000-gal. tanks which are maintained as standby storage to meet winter peak load heating requirements. The interest by utilities in L.P.G. during the past year has been unprecedented and from all indications will continue. Utilities are finding that it is less expensive to install L.P.G. facilities and use L.P.G. for augmenting their present supply or for standby than to install additional manufacturing capacity or pay higher demand charges to the pipe-line companies for natural gas supplied during peak demand periods only.

Because of the inability of the L.P.G. industry to make firm commitments for additional sales, there was a relatively small number of small-town manufactured gas plants converted to use L.P.G. exclusively this past year. At the close of 1947 there were approximately 330 small-town gas plants using L.P.G. exclusively for distribution through the mains.

Chemical Uses Grow

The use of L.P.G. by the chemical industry continues to increase principally for conversion to chemical intermediates. To guarantee obtaining these raw materials new chemical plants are locating adjacent to the points of production of L.P.G. This has resulted in much L.P.G. being delivered either in the liquid or gas phase by pipe line from the points of production to the chemical plants. It is estimated that 415,000,000 gal. were consumed by the chemical industry in 1947. This represented an increase over 1946 of 34.9 per cent.

Highlights of 1947

Individual companies, national and state associations, and regulatory authorities have been active in the development of additional safety standards and in promoting safe practices. National Board of Fire Underwriters' Pamphlet 58 entitled "Standards for the Design, Installation and Construction of Containers and Pertinent Equipment for the Storage and Handling of Liquefied Petroleum Gases as Recommended by the National Fire Protection Association" continues to be accepted by the industry and by regulatory bodies as a code of safe practices. This pamphlet is now the basis for laws or regulations in 35 states.

The amount of L.P.G. exported continues to represent approximately 3 per cent of this country's sales. The largest volume of these exports moved to Canada and Mexico. During the past year a dry-cargo ship was converted to a propane tank ship which is scheduled to carry propane from the gulf to the eastern seaboard. There is an increased interest in the use of skid-tanks as deck cargo for the export of L.P.G. Some of the present export business is moving in ICC cylinders.

More Trailer Homes

There was a tremendous increase in the number of trailer homes which installed L.P.G. equipment in 1947. While many of these installations were placed on mobile trailers used for pleasure and outing trips, the great majority were used to supply continuous gas service for ordinary domestic use in trailer homes which for the moment are stationary and which are so used because of the widespread housing shortage.

There is a huge potential supply of propane existing in gas streams but unrecovered at the present time. To segregate any significant volume of this potential supply requires much additional equipment costing considerably more than the extraction facilities which have heretofore been installed. In the case of propane obtained from natural gas sources, increased quantities are being secured generally by expensively increasing the recovery efficiencies of the extraction units to obtain a greater percentage of the propane available in the streams being processed. Frequently the added investment per gallon is as much as three times the amount invested in the past for facilities designed for lower recoveries. In the case of material secured from refineries it is usually necessary to first replace the extracted material with fuel oil or natural gas since the unextracted L.P.G. are generally consumed as fuel at the refineries. It is necessary generally for the refinery to install new extraction and purification equipment in order to produce specification products.

The increased cost of additional production facilities today is magnified by the rising costs in both material and labor. All these factors have contributed materially to the increased cost of propane. Butane has been rather completely recovered at most plants for several years.

Worlds' Deep Production Record May Be Bettered

The depth record for producing wells now held by Texas Co. 1 Lafourche Basin, at Queen's Island, Jefferson Parish, Louisiana, with pay zone at 13,879-13,904 ft., was being threatened by two new contenders as the year end approached.

Stanolind Oil & Gas Co. 1 Briscoe in Grady County, Oklahoma, was flowing around 200 bbl. of oil daily on drill-stem tests which took in a section from 13,678 ft. to 14,238 ft., total depth. Stanolind officials refused to make any claims at this time, because the well had previously made 470 bbl. per day from an interval of 13,634-13,875 ft., and most of the effective pay in this upper zone is still exposed. The Stanolind test may be drilled several hundred feet deeper, and considerable testing remains to be completed in any event. *(Picture on page 23).*

Meantime, Humble Oil & Refining Co. 1 State-Calcasieu Lake, Lease 1,256, in Cameron Parish, Louisiana, had set pipe at 14,018 ft., and was preparing to test for completion as a gas well from a pay zone at 13,993-14,002 ft., where drill-stem test results indicated successful results were likely.

Dual-Fuel Automobile Engine Is Reported

An automobile engine which will operate on both high and low octane gasoline has been built and is being tested by engineers of Socony-Vacuum Oil Co., Inc.

High-octane fuel is used in starting and accelerating, and the low-octane fuel, which has an octane rating much lower than regular gasoline, is used during normal cruising. The switching of fuels is accomplished automatically.

Louisiana Allowable Passes 500,000 Bbl.

Louisiana's monthly oil allowable has exceeded the half-million-barrel daily figure for the first time in the state's history.

Permissible production for January is 504,070 bbl. daily, according to Joseph L. McHugh, commissioner of conservation. Louisiana's daily average production the week ended December 20 was reported at 465,025 bbl. daily.

Flat 50-Cent Increase by California Standard Is Shown in New Posting

THE new schedule of crude oil prices in California as published by Standard Oil Co. of California, December 27, is shown in the table on this page, reflecting a flat increase of 50 cents per barrel over the schedule prevailing previously.

California Standard's postings, which are generally accepted as determining crude prices in the area, were raised nearly a month after Union Oil Co. of California announced a general increase of 40 cents per barrel, effective December 1, 2 days after Sun Oil Co. initiated what became a general increase of 50 cents throughout the rest of the country.

Standard's schedule has now been met by Union and other California crude purchasers.

New Flat-Price Crude-Oil Table

ARKANSAS

Field, pool, county—	Price $/bbl.
Big Creek*	2.80
Calhoun*	2.80
Columbia*	2.80
Dorcheat-Macedonia (Lime)*	2.80
Dorcheat-Macedonia (Sand)*	2.85
McKamie*	2.80
Smackover (Heavy)	2.33

COLORADO

Florence-Canon City	2.45

ILLINOIS

Basin (Illinois-Indiana)	2.77
Loudon	2.77
Mattoon	2.77
Plymouth	2.65

KENTUCKY

Field, pool, county—	Price $/bbl.
Bowling Green	2.57
Hitesville	2.77
Clinton, Laurel, Clay	2.60
Owensboro-Henderson	2.77
Sommerset grade	2.83
Ragland grade	2.43
Robards	2.77
St. Vincent	2.77

KANSAS

Marcotte	2.41
Morel	2.41
Palco	2.41

LOUISIANA

Bear	2.75
Cotton Valley*†	2.85
Cotton Valley	2.70
Lisbon*	2.85
Neal, Bivens (Beauregard Parish)	2.60
Ville Platte	2.75
West Mermentau	2.75

MICHIGAN

Field, pool, county—	Price $/bbl.
Barton	2.93
Cato	2.89
Coldwater	2.89
Douglas	2.89
Rose Lake	2.93

MISSISSIPPI

Carthage Point*	2.85
Gwinville*	2.85
Fayette*	2.85

MONTANA

Cat Creek	2.75
Cut Bank	2.70
Darling	2.50
Gage Dome	2.70

OHIO

Lima crude	2.90
Southeastern Ohio	4.75
Zanesville	4.445

PENNSYLVANIA

Allegany District	5.00
Bradford District	5.00
Corning grade	2.60
Middle District	5.00
Southwestern Pennsylvania	4.79

TEXAS

Bazette	2.65
Boynton	2.48
Chapel Hill*	2.65
Chapel Hill	2.58
Clark*	2.54
Clay Creek	2.40
Conroe	2.83
Darst Creek	2.54
East Texas‡	2.65
Flag Lake	2.65
Hilbig	2.54
Hobson-Hysaw	2.65
Lentz	2.54
Long Lake	2.65
Luling-Branyon (Low Gr.)	2.45

(Continued on Next Page)

Standard Oil Co. of California

Prices Effective December 27

(All gravities above those quoted take highest price offered in that field)

Gravity—	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier, East Coyote	Montebello	West Coyote Hills	Santa Fe Springs	Newhall, Kern River, Kern Front, McKittrick, Round Mtn., Mt. Poso	Greeley, Wasco, Coles Levee, Elk Hills Stevens Zone	Mountain View	Elk Hills (Shal.), Buena Vista Hills, Midway-Sunset, Lakeview Area	Lost Hills	Coalinga, Raisin City	Wheeler Ridge	Kettleman Hills	Elwood Terrace	Gato Ridge
12-12.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.16	...	...	2.16	2.16	2.16	...	...	...	1.94
13-13.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.17	...	...	2.17	2.17	2.17	...	...	...	1.96
14-14.9	...	...	2.13	2.15	...	2.16	2.18	2.15	...	2.15	2.15	2.15	2.17	...	...	2.18	...	...	2.18	2.18	2.18	...	...	1.98
15-15.9	...	...	2.15	2.16	...	2.18	2.20	2.16	...	2.16	2.16	2.16	2.18	...	...	2.19	...	...	2.19	2.19	2.19	...	...	1.99
16-16.9	...	...	2.17	2.17	...	2.20	2.21	2.17	...	2.17	2.17	2.17	2.19	...	...	2.20	...	...	2.20	2.20	2.20	...	...	2.00
17-17.9	...	...	2.19	2.18	...	2.22	2.23	2.18	...	2.18	2.18	2.18	2.20	...	...	2.21	...	...	2.21	2.21	2.21	...	...	2.01
18-18.9	...	2.17	2.21	2.19	...	2.24	2.24	2.19	...	2.19	2.19	2.19	2.21	...	...	2.22	...	...	2.22	2.22	2.22	...	...	2.02
19-19.9	...	2.19	2.23	2.20	...	2.26	2.26	2.20	...	2.20	2.20	2.20	2.22	...	...	...	...	2.21	2.23	2.23	2.23	...	...	...
20-20.9	...	2.21	2.25	2.21	...	2.28	2.27	2.22	...	2.21	2.22	2.21	2.23	...	...	...	...	2.22	2.24	2.24	2.24	2.16	...	...
21-21.9	...	2.23	2.27	2.22	...	2.30	2.28	2.26	...	2.22	2.25	2.24	2.24	...	...	...	...	2.23	2.25	2.25	2.25	2.17	...	...
22-22.9	...	2.27	2.31	2.23	2.19	2.32	2.29	2.29	...	2.24	2.29	2.27	2.25	2.27	...	...	...	2.24	2.26	2.26	2.26	2.18	...	...
23-23.9	...	2.30	2.34	2.25	2.24	2.35	2.32	2.32	...	2.28	2.32	2.30	2.27	2.30	...	...	...	2.25	2.29	2.27	2.27	2.19	...	...
24-24.9	...	2.34	2.37	2.28	2.29	2.37	2.34	2.36	...	2.31	2.36	2.33	2.30	2.32	...	...	...	2.26	2.33	2.28	2.28	2.20	...	...
25-25.9	...	2.38	2.41	2.32	2.33	2.40	2.37	2.39	...	2.34	2.39	2.36	2.33	2.35	...	...	...	2.27	2.37	2.31	2.30	...	...	...
26-26.9	...	2.41	2.44	2.36	2.38	2.42	2.39	2.43	...	2.38	2.43	2.39	2.36	2.38	...	...	...	2.31	2.41	2.34	2.33	...	...	...
27-27.9	...	2.45	2.47	2.39	2.43	2.44	2.42	2.46	2.38	2.41	...	2.42	2.40	2.41	2.39	...	...	2.35	2.45	2.37	2.36	...	...	...
28-28.9	...	2.49	2.51	2.43	2.47	2.46	2.45	2.49	2.42	2.44	...	...	2.43	2.44	2.43	...	...	2.39	2.49	2.39	2.39	...	...	...
29-29.9	...	2.52	2.54	...	2.52	2.48	2.47	...	2.46	...	...	...	2.47	2.46	2.47	...	...	2.44	2.54	2.42	2.41	...	...	...
30-30.9	...	2.56	2.57	...	2.56	2.50	2.50	...	2.50	...	...	...	2.50	2.49	2.50	...	2.35	2.48	2.58	2.45	2.44	...	...	...
31-31.9	...	2.59	2.60	...	2.61	...	2.53	...	2.54	...	...	...	2.54	2.52	2.54	...	2.39	2.52	2.62	...	2.47	...	2.40	...
32-32.9	...	2.62	...	...	2.64	...	...	...	2.58	...	...	...	2.58	2.55	2.58	...	2.42	2.56	...	...	2.49	...	2.44	f.o.b. ship
33-33.9	...	...	...	...	2.68	...	...	...	2.62	...	...	...	2.62	2.57	2.61	...	2.46	2.60	...	...	2.51	...	2.48	2.55
34-34.9	...	...	...	...	2.71	...	...	...	2.66	...	...	...	2.66	2.60	2.65	...	2.49	2.64	...	...	2.53	...	2.52	2.59
35-35.9	...	...	...	...	2.75	...	...	...	...	...	...	...	2.70	2.63	...	...	2.52	2.68	...	...	2.56	...	2.56	2.63
36-36.9	...	...	...	...	...	...	...	...	...	...	...	...	2.73	...	...	...	2.56	...	...	...	2.58	...	2.60	...
37-37.9	...	...	...	...	...	...	...	...	...	...	...	...	2.76	...	...	...	2.59	...	...	...	2.61	...	2.64	...
38-38.9	...	...	...	...	...	...	...	...	...	...	...	...	2.78	...	...	...	2.62	...	...	...	...	...	...	...
39-39.9	...	...	...	...	...	...	...	...	...	...	...	...	2.81	...	...	...	2.65	...	...	...	...	...	...	...
40-40.9	...	...	...	...	...	...	...	...	...	...	...	...	2.84	...	...	...	2.68	...	...	...	...	...	...	...

New Table Shows Current Crude Prices In Midwestern, Rocky Mountain Areas

HOW the increase of 50 cents per barrel in the price of crude oil which became general early in December affects the price in major fields of the Midwestern and Rocky Mountain areas is shown in the accompanying comprehensive tables.

The increase was first announced by Sun Oil Co. to be effective November 28. During the ensuing week it was met by other crude purchasers and became general December 6.

To find the price of crude oil in a particular field or area, locate the field in the alphabetical listings at the top of the two pages. The number opposite the field's name refers to the column in the gravity-price table below which carries the posting for that field.

FLAT PRICES

TEXAS (Continued)

Field, pool, county—	Price $/bbl.
Manford	2.54
Mt. Sylvan	2.48
North Vidor	2.80
Riddle, etc.	2.57
South Cotton Lake	2.75
South Tyler	2.65
Tenny Creek	2.54
Tomball	2.83
United	2.54
Van	2.48
Willmar	2.50
Yates Deep	2.35
Zoborosky	2.54

WEST VIRGINIA

Pennsylvania grade	4.79

WYOMING

Medicine Bow	2.875
Mule Creek	2.41
Osage	2.75

*Distillate. †Premier O. & R. Co., posting $2.95. ‡Premier O. & R. Co., posting $2.75.

Areas, Fields, Companies Tabulated by State

ARKANSAS

Field, county or parish, pool, posting company—	Price Sched. Col. No.
Atlanta, etc. (Limestone, Ark. sour crude)—Standard of N. J.	6
Atlanta, etc. (Sandstone, N. La. Ark. sweet)—Standard of N. J.	16
Big Creek, Delhi, etc.—Std. of N. J.	5
Caddo, Rodessa, etc.—Std. of N. J.	5
Miller, Rodessa, etc.—Magnolia	18
Schuler (Jones sand)—Std. of N. J., Phillips	37
Stephens—Ohio Oil	3

COLORADO

Ft. Collins, Wellington—Continental	9
Rangely, Iles, Elk Springs—Standard (Ind.)	2
Tow Creek, etc.—Texas Co.	13
Walden—Continental	13

ILLINOIS-INDIANA

Eastern Illinois - Western Indiana—Ohio Oil	4

KANSAS

All fields—Carter, Continental, Gulf, Mid-Continent, Phillips, Shell, Standard (Ind.), White Eagle*	2
Cities Service, Sinclair Prairie, Skelly, Texas Co.	5
Pure	15

*Starts: 21-21.9—$2.27.

LOUISIANA

Big Creek—Delhi, etc., Std. of N. J., Stanolind Pur. Co., Sun*	5
Big Lake, etc.—Continental	11
Bosco, etc.—Pure†	12
Cameron—Magnolia	42
Caddo—Stanolind O. & G., Magnolia	18
Central La.—Std. of N. J.	17
Coastal La.—Texas Co., Std. of N. J., Pan. Am. Prod.	11
Hackberry E. & W.—Stanolind O.&G.	20
Holly Ridge—Stanolind Pur. Co.	17
Jennings—Stanolind Oil & Gas	19

Prices According to Gravity

A.P.I. gravity—	Montana, Wyoming 1	Okla., Kans., Mont., Wyo., Tex 2	Arkansas 3	Illinois, Indiana 4	Neb., Kans., Tex., Ark., Okla. 5	Arkansas 6	Wyoming, Texas, N. Mex. 7	Wyoming 8	Colorado 9	New Mexico 10	Louisiana, Texas 11	Louisiana, Texas 12	Texas, Colorado 13	Texas 14	Okla., Texas, Kansas 15	Arkansas, Louisiana 16	Ark., La., Texas 17	Louisiana 18	Louisiana 19	Louisiana, Texas 20	Texas 21	Texas 22	Texas 23
15-15.9	1.97	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16-16.9	1.99	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17-17.9	2.01	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18-18.9	2.03	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19-19.9	2.05	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Below 20	...	...	...	...	2.23	2.19	2.10	...	...	...	2.33	2.43	...	...	...	2.21	2.28	...	...	...	...	...	...
20-20.9	2.07	...	...	...	2.25	2.21	2.12	...	...	...	2.35	2.45	...	...	...	2.23	2.30	...	...	...	...	...	...
Below 21	...	2.25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21-21.9	2.09	2.27	...	...	2.27	2.23	2.14	...	...	...	2.37	2.47	...	...	...	2.25	2.32	...	...	...	...	...	...
22-22.9	2.11	2.29	...	...	2.29	2.25	2.16	...	...	...	2.39	2.49	...	...	...	2.27	2.34	...	...	...	...	...	...
23-23.9	2.13	2.31	...	...	2.31	2.27	2.18	...	...	...	2.41	2.51	...	...	...	2.29	2.36	...	...	...	...	...	...
Below 24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.54	2.61	...	2.41
24-24.9	2.15	2.33	...	...	2.33	2.29	2.20	...	...	...	2.43	2.53	...	...	...	2.31	2.38	...	...	2.56	2.63	...	2.43
Below 25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.33	...	...	...	2.35	...
25-25.9	2.17	2.35	2.33	...	2.35	2.31	2.22	...	...	...	2.45	2.55	...	...	2.35	2.33	2.40	2.35	...	2.58	2.65	2.37	2.45
26-26.9	2.19	2.37	2.35	...	2.37	2.33	2.24	...	...	...	2.47	2.57	...	...	2.37	2.35	2.42	2.37	...	2.60	2.67	2.39	2.47
27-27.9	2.21	2.39	2.37	...	2.39	2.35	2.26	...	...	...	2.49	2.59	...	...	2.39	2.37	2.44	2.39	...	2.62	2.69	2.41	2.49
28-28.9	2.23	2.41	2.39	...	2.41	2.37	2.28	...	...	...	2.51	2.61	...	...	2.41	2.39	2.46	2.41	...	2.64	2.71	2.43	2.51
Below 29	...	...	...	2.63	...	...	...	2.26	2.36	2.28	...	...	2.41	...	...	...	...	...	...	...	...	...	...
29 and above	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29-29.9	2.25	2.43	2.41	2.65	2.43	2.39	2.30	2.28	2.38	2.30	2.53	2.63	2.43	...	2.43	2.41	2.48	2.43	...	2.66	2.73	2.45	2.53
30 and above	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30-30.9	2.27	2.45	2.43	2.67	2.45	2.41	2.32	2.30	2.40	2.32	2.55	2.65	2.45	...	2.45	2.43	2.50	2.45	...	2.68	2.75	2.47	2.55
31-31.9	2.29	2.47	2.45	2.69	2.47	2.43	2.34	2.32	2.42	2.34	2.57	2.67	2.47	...	2.47	2.45	2.52	2.47	...	2.70	2.77	2.49	2.57
Below 32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.52	...	...	...	...
32-32.9	2.31	2.49	2.47	2.71	2.49	2.45	2.36	2.34	2.44	2.36	2.59	2.69	2.49	...	2.49	2.47	2.54	2.49	2.54	2.72	2.79	2.51	2.59
33-33.9	2.33	2.51	2.49	2.73	2.51	2.47	2.38	2.36	2.46	2.38	2.61	2.71	2.51	...	2.51	2.49	2.56	2.51	2.56	2.74	2.81	2.53	2.61
34 and above	...	...	...	...	...	...	...	...	...	...	...	...	...	2.63	...	...	...	...	...	2.76	...	...	...
34-34.9	2.35	2.53	2.51	2.75	2.53	2.49	2.40	2.38	2.48	2.40	2.63	2.73	2.53	2.65	2.53	2.51	2.58	2.53	2.58	...	2.83	2.55	2.63
35 and above	...	...	...	2.77	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35-35.9	2.37	2.55	2.53	...	2.55	2.51	2.42	2.40	2.50	2.42	2.65	2.75	2.55	2.67	2.55	2.53	2.60	2.55	2.60	...	2.85	2.57	2.65
36-36.9	2.39	2.57	...	...	2.57	2.53	2.44	2.42	2.52	2.44	2.67	2.77	2.57	2.69	2.57	2.55	2.62	2.57	2.62	...	2.87	2.59	2.67
37-37.9	2.41	2.59	...	...	2.59	2.55	2.46	2.44	2.54	2.46	2.69	2.79	2.59	2.71	2.59	2.57	2.64	2.59	2.64	...	2.89	2.61	2.69
38-38.9	2.43	2.61	...	...	2.61	2.57	2.48	2.46	2.56	2.48	2.71	2.81	2.61	2.73	2.61	2.59	2.66	2.61	2.66	...	2.91	2.63	2.71
39-39.9	2.45	2.63	...	...	2.63	2.59	2.50	2.48	2.58	2.50	2.73	2.83	2.63	2.75	2.63	2.61	2.68	2.63	2.68	...	2.93	2.65	2.73
40 and above	2.47	2.65	...	...	2.65	2.61	2.52	2.50	2.60	2.52	2.75	2.85	2.65	2.77	2.65	2.63	2.70	2.65	2.70	...	2.95	2.67	2.75

Field, county or parish, pool, posting company—	Price Sched. Col. No.
Lewisberg, etc.—Stanolind Pur. Co.	17
Mamou—Magnolia	11
Venice—Tide Water†	32
Vermillion—Stanolind Pur. Co.	11

*Starts: Below 24—$2.31. †Starts: 23 and below—$2.44. ‡Starts: 21-21.9—$2.47.

MISSISSIPPI

Brookhaven—Std. of N. J.	17
Eucutta and Heidelberg—Std. of N. J.	46
Pickens—Carter*	24
Tinsley	24

*Starts: 24-24.9—$2.26.

MONTANA-WYOMING

E. Mahoney Dome—Sinclair-Wyoming	8
Elk Basin (Tensleep)—Carter, Ohio, Stanolind O. & G.	1
Elk Basin (Lt.)—Ohio, Stanolind O. & G.	2
La Barge—Standard (Ind.)	2
Lance Creek, etc.—Continental, Carter	2
Lost Soldier (Ex. Tensleep), etc.—Sinclair-Wyoming	2
Lost Soldier (Tensleep)—Sinclair-Wyoming	7
Oregon Basin, etc.—Standard (Ind.), Texas Co.	1

NEBRASKA

Barada, Falls City—Skelly	5

NEW MEXICO

Brunson, Drinkard—Magnolia, Gulf*	41
Brunson, Drinkard, etc.—Cities Service, Shell, Sinclair Prairie, Texas Co.	24
Eddy, Lea—Continental	10
Lea, Chaves—Stanolind Pur. Co.	36
Lea (Exceptions)—Atlantic, Cities Service, Gulf†, Humble, Magnolia, Sinclair Prairie, Texas Co.	7

*Starts: Below 26—$2.28. †Starts: Below 26—$2.22.

OKLAHOMA

Field, county or parish, pool, posting company—	Price Sched. Col. No.
All fields—Bell, Ben Franklin, Carter, Champlin, Continental, Gulf, Magnolia, Mid-Continent, Phillips, Shell, Standard (Ind.), Tide Water, Wilcox	2
Sinclair Prairie, Texas Co., Skelly, Cities Service	5
Pure (With Exceptions)	15
Okla. City, Cement—Anderson-Prichard*	5

*Starts: Below 11—$1.95.

TEXAS

Abell, etc.—Sinclair Prairie, Magnolia	18
Agua Dulce, etc.—Sinclair Prairie	29
Andector, etc.—Phillips	24
Anderson, etc.—Humble	33
Aransas—Atlantic	14
Archer, etc.—Magnolia, Std. (Ind.)	13
Barbers Hill—Atlantic	44
Block 31 (Devonian)—Atlantic, Texas Co.	24
Block 31 (Ellenburger)—Atlantic, Humble, Texas Co.	5
Boling, etc.—Sinclair Prairie	26
Caplen, etc. (with exceptions)—Sun*	29
Carson, Gray, etc.—Magnolia	13
Cass, Marion, etc.—Magnolia	18
Clinton, etc.—Stanolind Pur. Co.	39
Colmena, etc.—Sinclair Prairie	27
Daboval, etc.—Sinclair Prairie	25
Dyersdale, Trinity—Stanolind Pur Co.	35
Egan, etc.—Sun	23
Fargo (Odell)—Bell Western	2
Fullerton, etc.—Stanolind Pur. Co., Magnolia	41
Goose Creek, etc. (with exceptions)—Sun	35
Goose Creek, etc. (low cold test)—Humble	26
Guerra, etc.—Sun†	12
Hastings, etc.—Humble, Pan American	30
Hawkins, etc.—Humble	34
Henderson, etc.—Stanolind O. & G.	7
High Island—Stanolind O. & G.	30
Holland, etc.—Sun	21
Humble 28° and above, etc.—Texas Co.	29
Jay Welder—Stanolind O. & G.	29
Joyce Richardson, etc.—Standard (Ind.)	39
Kohler, Peters, etc.—Magnolia	27
Lake Creek, etc.—Standard (Ind.)	38
Maubro, Texana, etc.—Magnolia	43
Mexia—Sinclair Prairie	22
North Texas—Bell O. & G., Stanolind Pur. Co.	2
North Texas—Panhandle Ref., Continental	13
O'Hern (East Bruni)—Magnolia	27
Old Ocean, etc.—Texas Co.	30
Pearsoll—Humble	31
Quitman—Pan American	40
Refugio—Humble	28
Refugio-Greta—Atlantic	45
Rincon, etc.—Continental	12
Rosita, etc.—Sinclair Prairie	28
Seeligson, etc.—Humble, Magnolia, Sun*	29
Spindletop—Stanolind O. & G.	26
Stowell, etc. (with exceptions)—Sun	25
TXL-Ellenburger, etc.—Phillips	2
University—Std. of N. J.	30
Welder, etc.—Humble	21
West Beaumont—Standard (Ind.)	35
West-Central Texas—Panhandle Ref.	15
West-Central Texas—Humble	5
West Texas (other than Andector, etc.)—Phillips	36
West Texas (with exceptions)—Atlantic, Cities Service, Humble, Magnolia, Sinclair Prairie, Texas Co.	7
Wheeler, Hutchinson, etc.—Humble	5
Wichita—Standard (Ind.)	2
Winkler, etc.—Stanolind Pur. Co.	36

*Starts: Below 24—$2.46. †Starts: Below 24—$2.51.

For Fields Included and Posting Companies, Refer to Corresponding Column Number in Tabulation Above

A.P.I. gravity—	N. Mexico, Miss., Tex. 24	Texas Louisiana 25	Texas 26	Texas 27	Texas 28	Texas 29	Texas 30	Texas 31	Louisiana 32	Texas 33	Texas 34	Texas 35	Texas, N. Mexico 36	Arkansas 37	Texas 38	Texas 39	Texas 40	Texas, N. Mexico 41	Louisiana 42	Texas 43	Texas 44	Texas 45	Mississippi 46
15-15.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..
16-16.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17-17.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18-18.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19-19.9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Below 20	2.16	...	...	...	2.48	2.38	2.46	2.20	...	2.25	2.20	...	...	2.14	...	...	2.18	...	2.43	2.43	2.56	...	2.06
20-20.9	2.18	...	...	...	2.50	2.40	2.48	2.22	...	2.27	2.22	...	...	2.16	...	...	2.20	...	2.45	2.45	2.68	...	2.08
Below 21	...	...	...	...	...	...	...	...	...	...	...	...	2.12	...	2.48	2.35	...	...	...	...	...	2.50	...
21-21.9	2.20	...	...	...	2.52	2.42	2.50	2.24	...	2.29	2.24	...	2.14	2.18	2.50	2.37	2.22	...	2.47	2.47	2.60	2.52	2.10
22-22.9	2.22	...	...	...	2.54	2.44	2.52	2.26	...	2.31	2.26	...	2.16	2.20	2.52	2.39	2.24	...	2.50	2.49	2.62	2.54	2.12
23-23.9	2.24	...	...	...	2.56	2.46	2.54	2.28	2.44	2.33	2.28	...	2.18	2.22	2.54	2.41	2.26	...	2.53	2.51	2.64	2.56	2.14
Below 24	...	2.54	2.64	2.61	...	...	...	...	...	...	...	2.64	...	...	...	...	...	...	...	...	...	...	...
24-24.9	2.26	2.56	2.66	2.63	2.58	2.48	2.56	2.30	2.46	2.35	2.30	2.66	2.20	2.24	2.56	2.43	2.28	...	2.56	2.53	2.66	2.58	2.16
Below 25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.26	...	...	...	...	...
25-25.9	2.28	2.58	2.68	2.65	2.60	2.50	2.58	2.32	2.48	2.37	2.32	2.68	2.22	2.26	2.58	2.45	2.30	2.28	2.59	2.55	2.68	2.60	2.18
26-26.9	2.30	2.60	2.70	2.67	2.62	2.52	2.60	2.34	2.50	2.39	2.34	2.70	2.24	2.28	2.60	2.47	2.32	2.30	2.62	2.57	2.70	2.62	2.20
27-27.9	2.32	2.62	2.72	2.69	2.64	2.54	2.62	2.36	2.52	2.41	2.36	2.72	2.26	2.30	2.62	2.49	2.34	2.32	2.64	2.59	2.72	2.64	2.22
28-28.9	2.34	2.64	2.74	2.71	2.66	2.56	2.64	2.38	2.54	2.43	2.38	2.74	2.28	2.32	2.64	2.51	2.36	2.34	2.66	2.61	2.74	2.66	2.24
Below 29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29 and above	...	...	...	2.73	...	...	...	...	...	...	2.40	2.76	...	...	...	...	...	...	...	...	...	...	...
29-29.9	2.36	2.66	2.76	...	2.68	2.58	2.66	2.40	2.56	2.45	...	...	2.30	2.34	2.66	2.53	2.38	2.36	2.68	2.63	2.76	2.68	2.26
30 and above	...	...	2.78	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.28
30-30.9	2.38	2.68	...	...	2.70	2.60	2.68	2.42	2.58	2.47	...	...	2.32	2.36	2.68	2.55	2.40	2.38	2.70	2.65	2.78	2.70	...
31-31.9	2.40	2.70	...	...	2.72	2.62	2.70	2.44	2.60	2.49	...	...	2.34	2.38	2.70	2.57	2.42	2.40	2.72	2.67	2.80	2.72	...
Below 32	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32-32.9	2.42	2.72	...	...	2.74	2.64	2.72	2.46	2.62	2.51	...	...	2.36	2.40	2.72	2.59	2.44	2.42	2.74	2.69	2.82	2.74	...
33-33.9	2.44	2.74	...	...	2.76	2.66	2.74	2.48	2.64	2.53	...	...	2.38	2.42	2.74	2.61	2.46	2.44	2.76	2.71	2.84	2.76	...
34 and above	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.78	...	2.86	...	...
34-34.9	2.46	2.76	...	...	2.78	2.68	2.76	2.50	2.66	2.55	...	...	2.40	2.44	2.76	2.63	2.48	2.46	...	2.73	...	2.78	...
35 and above	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.75	...	...	...
35-35.9	2.48	2.78	...	...	2.80	2.70	2.78	2.52	2.68	2.57	...	...	2.42	2.46	2.78	2.65	2.50	2.48	...	...	...	2.80	...
36-36.9	2.50	2.80	...	...	2.82	2.72	2.80	2.54	2.70	2.59	...	...	2.44	2.48	2.80	2.67	2.52	2.50	...	...	...	2.82	...
37-37.9	2.52	2.82	...	...	2.84	2.74	2.82	2.56	2.72	2.61	...	...	2.46	2.50	2.82	2.69	2.54	2.52	...	...	...	2.84	...
38-38.9	2.54	2.84	...	...	2.86	2.76	2.84	2.58	2.74	2.63	...	...	2.48	2.52	2.84	2.71	2.56	2.54	...	...	...	2.86	...
39-39.9	2.56	2.86	...	...	2.88	2.78	2.86	2.60	2.76	2.65	...	...	2.50	2.54	2.86	2.73	2.58	2.56	...	...	...	2.88	...
40 and above	2.58	2.88	...	...	2.90	2.80	2.88	2.62	2.78	2.67	...	...	2.52	2.56	2.88	2.75	2.60	2.58	...	...	...	2.90	...

STATISTICS and T

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 27, 1947

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1947				
	Comp.	Oil	Gas	Dry	Footage	1947	1946	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	35	18	0	*17	34,090	1,746	1,556	0	0	0	0	0	3	0	0	2	5
Pennsylvania	62	30	5	†27	101,367	3,122	3,909	0	0	0	0	0	0	0	8	6	14
West Virginia	9	1	7	1	25,100	858	749	0	0	3	0	3	5	0	40	35	80
Ohio	22	5	5	‡12	70,046	1,361	1,273	0	0	0	0	0	0	0	8	43	51
Indiana	18	8	0	10	34,201	652	377	0	0	0	0	0	22	0	0	36	58
Kentucky	23	9	3	11	42,093	751	470	0	0	0	0	0	8	0	0	33	41
Illinois	40	20	1	19	101,134	2,083	2,311	0	0	0	6	6	62	0	1	358	421
Michigan	15	2	0	13	31,725	899	814	0	0	0	0	0	11	0	12	243	266
Kansas	72	27	7	§38	244,185	2,714	2,041	2	0	0	15	17	46	0	13	349	408
Neb., Mo., Iowa	2	0	0	2	1,116	7	19	0	0	0	2	2	0	0	0	7	7
Oklahoma	80	41	1	§38	277,881	4,001	3,039	2	0	0	19	21	115	9	24	692	840
Texas	152	98	6	48	660,819	9,130	7,782	2	0	1	16	19	293	54	83	1,438	1,868
North Central (Dist. 7-B & 9)	35	16	0	19	105,416	2,820	2,687	0	0	0	0	0	82	1	13	473	569
West (Dist. 7-C & 8)	49	44	1	4	223,419	2,250	1,779	1	0	0	1	2	49	0	4	169	222
Panhandle (Dist. 10)	10	8	0	2	35,407	481	310	0	0	0	0	0	1	0	2	11	14
Eastern (Dist. 5 & 6)	13	3	1	9	55,444	577	668	0	0	0	5	5	11	2	5	126	144
Gulf Coast (Dist. 3)	26	14	3	9	167,208	1,548	1,720	1	0	1	6	8	65	38	36	286	425
Southwest (Dist. 1, 2 & 4)	19	13	1	5	73,925	1,454	598	0	0	0	4	4	85	13	23	373	494
Louisiana	36	23	1	12	169,809	1,621	1,401	0	0	0	0	0	39	24	9	208	280
Northern	25	16	0	9	62,543	970	798	0	0	0	0	0	3	3	3	128	137
Southern	11	7	1	3	107,266	651	603	0	0	0	0	0	36	21	6	80	143
Arkansas	6	3	0	3	26,400	327	183	0	0	0	0	0	2	1	0	62	65
Mississippi	3	2	0	1	22,667	481	270	0	0	0	1	1	2	0	1	90	93
Southeastern States	1	0	0	1	1,505	64	44	0	0	0	1	1	0	0	0	55	55
Montana	6	4	2	0	10,425	308	312	0	0	0	0	0	7	0	8	28	43
Wyoming	10	8	0	2	32,407	266	168	1	0	0	0	1	14	0	6	45	65
Colorado-Utah	7	5	0	2	34,810	212	171	0	0	0	2	2	3	0	3	50	56
New Mexico	17	12	3	2	63,131	548	408	0	0	0	1	1	6	0	1	41	48
California	41	38	0	3	143,097	2,026	1,472	0	0	0	3	3	44	0	9	288	341
Total United States	657	354	41	262	2,128,008	33,177	28,769	7	0	4	66	77	682	88	226	4,109	5,105
Total previous week	669	352	61	256	2,319,663	32,520	28,256	17	0	7	102	126	675	88	222	4,043	5,028
Total December 28, 1946	513	290	59	164	1,881,945			9	0	0	63	72	550	43	127	3,523	4,243

Service wells included: *17, †25, ‡3, §1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.12
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.29	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.56	2.20
25-25.9	2.38	2.35	2.58	2.22
26-26.9	2.41	2.37	2.60	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

†For crude from Daboval, El Campo, and Sand Point. ‡Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT, WEEK ENDED DECEMBER 20

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	796	1,871	297	1,176	1,518	18,640	6,321	13,605	7,377
Appalachian:									
District 1	106	360	54	92	90	1,900	312	630	419
District 2	70	237	31	45	86	939	127	280	157
Ind., Ill., Ky.	816	2,870	447	897	1,059	15,945	2,431	7,121	4,847
Okla., Kans., Mo.	436	1,492	155	523	464	8,161	981	3,191	1,543
Inland Texas	243	1,020	140	148	401	3,057	591	478	622
Texas Gulf Coast	1,352	3,951	614	1,965	1,857	15,137	2,595	8,604	7,537
La. Gulf Coast	417	1,094	399	732	569	4,396	1,860	2,818	2,255
N. La. and Ark.	75	204	56	63	114	1,455	438	430	199
Rocky Mountains:									
New Mexico	10	30	3	8	24	81	25	24	28
Other Rocky Mts.	140	434	34	168	273	1,872	139	837	666
California	785	2,443	61	703	2,188	15,473	1,046	13,484	26,463
Dec. 20, 1947	5,246	16,006	2,291	6,520	8,643	87,056	16,866	51,502	52,113
Dec. 13, 1947	5,104	15,705	2,485	6,337	8,580	87,608	18,127	55,032	53,318
Dec. 21, 1946	4,783	15,144	1,930	5,497	8,383	88,665	17,980	62,239	53,773

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 223,474,000 bbl. as of December 13—up 1,036,000 bbl. One year ago 226,966,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.	
East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	1.85
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

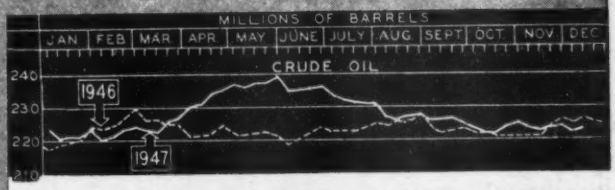
DAILY AVERAGE PRODUCTION FOR WEEK

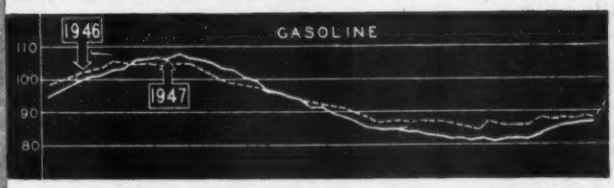
	Dec. 27 crude oil	B. of M. Dec. demand	Dec. 20 crude oil
Alabama	1,400	1,500	1,350
Arkansas	87,000	82,000	86,450
California	931,600	930,000	929,300
Colorado	47,200	47,000	48,050
Eastern	60,800	64,600	57,350
Florida	625	1,000	750
Illinois	177,400	195,000	175,100
Indiana	18,100	17,300	18,200
Kansas	295,550	306,000	290,650
Kentucky	28,700	26,000	26,700
Louisiana	465,075	446,000	465,025
North Louisiana	120,050	.....	120,000
South Louisiana	345,025	.....	345,025
Michigan	48,500	45,000	49,950
Mississippi	112,110	100,000	111,710
Montana	24,860	24,000	25,460
Nebraska	500	600	500
New Mexico	119,950	120,000	119,950
Oklahoma	409,300	405,000	411,050
Texas	2,348,600	2,300,000	2,348,600
Dist. 1 (Southwest)	24,850	.....	24,850
Dist. 2 (Southwest)	163,825	.....	163,825
Dist. 4 (Southwest)	258,000	.....	258,000
Dist. 3 (Gulf Coast)	488,000	.....	488,000
Dist. 5 (Eastern)	42,275	.....	42,275
Dist. 6 (Eastern)	119,575	.....	119,575
East Texas field	294,000	.....	294,000
Dist. 7-C (West)	41,385	.....	41,385
Dist. 8 (West)	648,750	.....	648,750
Dist. 7-B (W. Central)	42,100	.....	42,100
Dist. 9 (N. Central)	136,625	.....	136,625
Dist. 10 (Panhandle)	89,215	.....	89,215
Wyoming	133,550	125,000	133,810
Total United States	*5,310,820	5,236,000	5,299,955
Change from prev. wk., up	10,865		

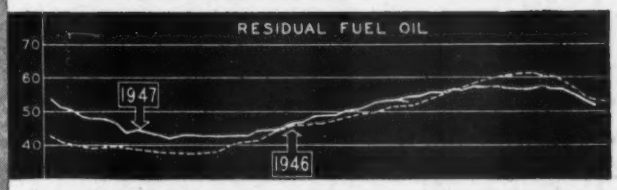
Total production January 1-December 27 †1,836,105,055 bbl.
Same period last year (crude plus cond.) 1,716,045,325 bbl.

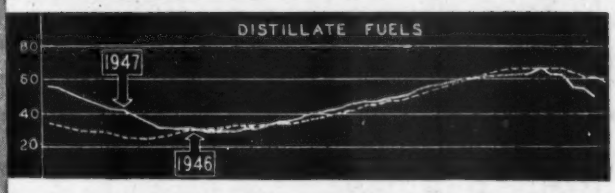
*Not incl. 45,520 bbl. condensate. †Incl. 12,535,210 bbl. condensate.

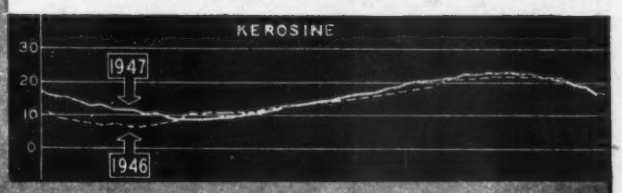
OIL STOCKS IN THE UNITED STATES



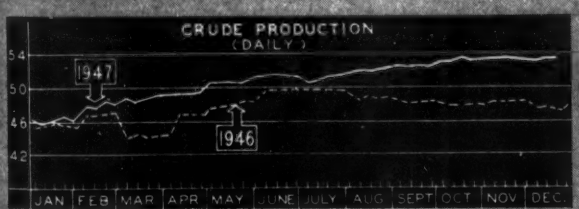


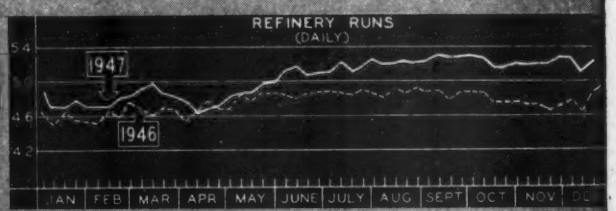




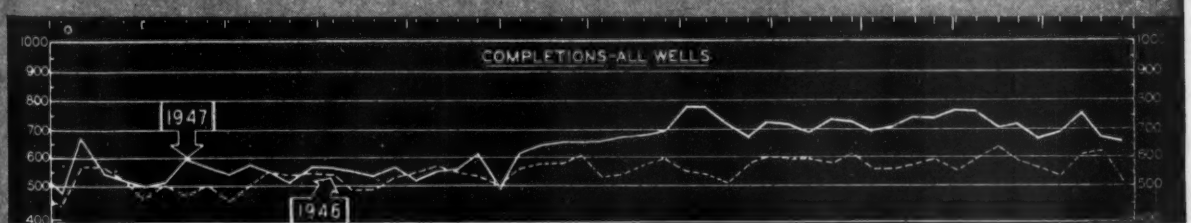


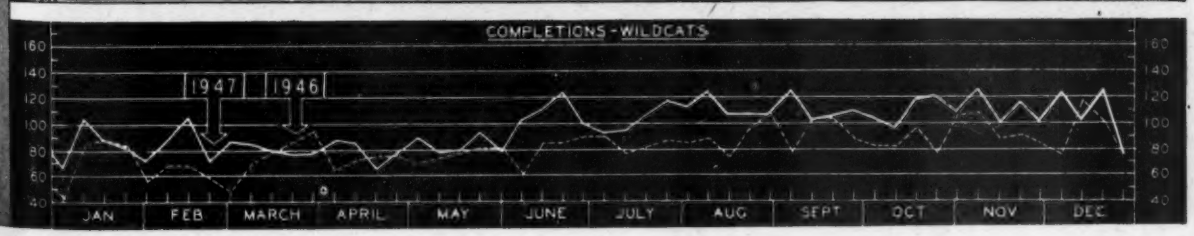
DAILY OPERATIONS



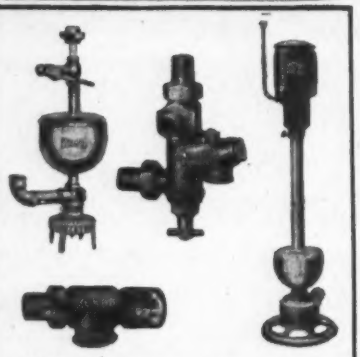


Solid line charts weekly completions, service wells in Eastern area included.





PENBERTHY
QUALITY
PRODUCTS



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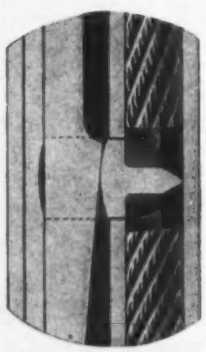

Enlarged drawing of section of tool inside tubing, showing tapered wedge forcing knife thru wire line

Cuts any size wire line up to 11/16" in any size pipe as small as 2" tubing. It cuts the stuck line at the top of the rope socket, thus saving the line as well as the cost of a fishing job.

Complete details will gladly be sent on request.

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OR TELEPHONE
FOR COMPLETE
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P. O. Box 6177
Phones:
Day or night K3-1221
Night K3-3649

M. M. KINLEY COMPANY
HOUSTON, TEXAS

MARKETS

OIL-PRODUCTS prices in the East Coast area continued to advance as several large suppliers brought their quotations into line with the new higher price levels.

In New York harbor, the former high of 11.9 cents per gallon for unbranded gasoline moved to 12.2 cents per gallon as one independent supplier reported an additional 0.3-cent advance. The low of $2.92 per barrel for No. 5 changed to $3.38 as one major company increased its heavy-oil price 46 cents per barrel at all points in which it markets along the seaboard, and the low No. 6 oil price moved from $2.57 to $3.

In New York City the tight oil situation remains virtually unchanged with a few large users of heavy fuel oil complaining of inability to get deliveries. Any pinch in the Eastern area is keenly felt in New York City where, according to recent figures compiled by the American Petroleum Institute, fuel-oil consumption is averaging about 20 per cent of the total daily consumption in the United States.

Conservation Urged

Volunteer conservation, both by commercial and domestic consumers, continued to be urged strongly by some observers, and one large supplier has cut supplies by 10 per cent "to prevent too severe shortages later on, therefore reserves must be built up immediately." In spite of the fact that production of fuel oils has been largely increased by most refiners to meet the unprecedented demand for burning and heating oils, stocks of these products continue to decline, and gasoline, which is usually building up on reserves during this season also has tended to decline.

On the West Coast Standard Oil Co. of California last week announced that it had become necessary to adjust its prices to producers because of higher levels prevailing elsewhere, and advanced the price it pays for crude oil 50 cents a barrel effective December 27. Gasoline was advanced 1.8 cents per gallon; gas and diesel oils and light fuels, 1.2 cents per gallon, and fuel oil 40 cents a barrel.

In the Mid-Continent area light fuel oils were causing suppliers some concern as material became harder to obtain. According to one buyer the high premiums being paid for the burning oils apparently are not making any more supplies available. Tank cars were exceptionally tight, according to several shippers. The material that was moving was usually at a "sizable" premium.

Offerings Scarce

A scarcity of offerings and bidding for what supplies were available continued in marketing operations on the Gulf Coast last week. Some regular-grade gasoline was reported moving at prices ranging up to 13 cents. No. 2 was said to be bringing as high as 11½ cents on the open spot market.

Prices for Gulf Coast lubricating oils were firm at existing levels. Spot-market lube-oil prices have not yet responded to the recent 50-cent crude advance, but some increase in these prices is anticipated. One marketing official said government action in controlling exports has eased supplies in the domestic market.

A nation-wide, 50-city gasoline-price tabulation as of December 1 showed that service-station price for gasoline, including tax, averaged 24.15 cents per gallon for the country, highest since 1922. Of all products light fuel oil demand was highest.

Representative Quotations

Representative spot-market quotations of leading suppliers as of December 29, 1947. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10¼-11½	10.6-12* 9.6-11.1†	10.9-13
Premium gasoline, 78-80 octane	11¾-12½	10.6-13.4	12.9-13½
42-44 ww. kerosine	9½-10½	8.5-10.5	10¼-11½
No. 2 straw fuel oil	9⅛-10⅛	7.6-9.6	9.05-11¼
No. 6 residual	$2.30-2.65	$2.55-3.24	$2.56-3.25

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 28-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	11-13¾
750 vis., No. 3-4 neutral	13-16¾
2,000 No. 5-6 neutral	14-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	46

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	8½-9¼

Announcing to the Petroleum Industry

ATWOOD AND MORRILL CO.

SALEM, MASS.

Manufacturers of Special Valves and Control Equipment
For Oil Refineries, Chemical Plants,
Central and Industrial Power Plants

- **TURBINE AND CONDENSER EQUIPMENT**
- **AIR AND HYDRAULICALLY OPERATED VALVES**
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- **COMPLETE REMOTE CONTROL SYSTEMS AIR OR HYDRAULICALLY OPERATED**
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BRANCH OFFICES
507 5th Ave., N. Y. C. — 12th & Walnut St. Bldg., Kansas City, Mo.

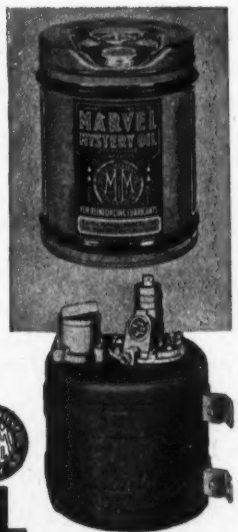
GUARD YOUR ENGINE'S HEART ZONE

LUBRICATE THE HEAT ZONE

Your engine's heart zone is its heat zone—the top cylinder area. That's where vital valves must work—where heat is hottest—where sizzling temperatures scorch lubricants and leave bare metal unprotected . . . that's where Marvel Mystery Oil and the Marvel Inverse Oiler really go to work!

Marvel Mystery Oil is specifically compounded to resist heat. Here's liquid armor for your engine's heart—this *extra*-tough protective film cleans at it coats! Marvel dissolves sticky gum, sludge and varnish from valves, guides and rings—keeps them cleanly coated.

Your engine throbs with power when lubrication is right. Performance picks up, and "down time" stays down. Ask for the facts. Emerol Mfg. Co., Inc., 232 W. 69th St., New York 23, N. Y.



The Marvel Inverse Oiler, easily installed, proportions the flow of Marvel Mystery Oil precisely to the needs of your engine.

use the

MARVEL

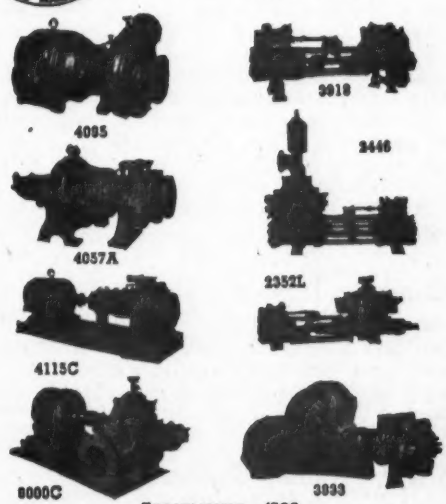
INVERSE OILER WITH MARVEL MYSTERY OIL

DEAN BROTHERS PUMPS INDIANAPOLIS IND.

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W TENTH ST.

EQUIPMENT MEN ... in the News

Dowell Announces Export Department

Dowell Incorporated, Tulsa, announces the formation of a foreign sales and export department to be located in Tulsa at the company's general offices. The increasing foreign interest in Dowell's products and services and Dowell's expanding interest in its Venezuelan associate, United Oilwell Service S.A., have made necessary the new department. The management of the new department will be the responsibility of P. E. Fitzgerald, who has been associated with Dowell for 15 years in various capacities including brief assignments in Canada, Mexico, and Venezuela and for more than 10 years the company's geologist. He will continue in this capacity and will also retain his membership on the board of United Oilwell Service.

Bailey Meter Appoints New Branch Manager

Bailey Meter Co., Cleveland, announces the appointment of G. R. Mays as manager of its St. Louis branch office located at 4030 Chouteau Avenue. He succeeds L. E. Evans whose resignation became effective December 15. Mays has been connected with Bailey Meter Co. since 1931 and has had wide experience in power-plant and process engineering and combustion work, particularly with reference to the solution of metering, controlling, and regulating problems.

Cushing Replaces Chadwick

J. W. Chadwick, division engineer for National Supply Co., will retire from service effective January 1 after 18 years' service with National. W. T. Cushing, Jr., will replace Chadwick.

U. S. Steel Names Cooper

United States Steel Corp. of Delaware announces the appointment of R. Conrad Cooper as vice president—industrial engineering.

Cooper assumed this newly created position on January 1, 1948. During World War II, Cooper served as industry member of the National War Labor Board Steel Commission, and with the War Manpower Commission as management member of the management-labor policy committee. He is a member and past chairman of the industrial relations committee of the American Iron and Steel Institute.

Peerless Announces Plant Removal

E. O. HALTOM

Peerless Manufacturing Co., Dallas, manufacturers of engineering specialties for the oil and chemical industries, has moved into its new plant, according to E. O. Haltom, new Peerless sales manager. The plant, spread over 20 acres just north of Dallas, has more than 15,000 sq. ft. of factory and office space and is so designed as to greatly increase the plant's output.

Haltom, who has recently taken his post as manager of sales, is well known throughout the oil and chemical industries. He joined Peerless after 20 years' service with Wyatt Metal & Boiler Works at Dallas where he was in charge of sales for the past several years.

Other officers of the newly expanded company are Mrs. D. A. Sillers, president, replacing her husband, the late Don A. Sillers; J. A. Mundie, former assistant manager of the Chase Bag Co.'s Dallas plant, vice president; Ray B. Owens, nationally known petroleum and chemical engineer, vice president and chief engineer, and Mary H. White, veteran Peerless employe, secretary and treasurer.

Steward Advertising Manager

Chad J. Steward has been appointed advertising manager of Dowell Incorporated, Tulsa. Steward, a graduate of the University of Tulsa, has had several years' experience in advertising and public relations and has been associated with Dowell sales and advertisement departments since 1941 except for the war years when he served with the U. S. Army overseas. He will continue to make his headquarters in the company's general offices.

Laucks Merges With Monsanto

Monsanto (Canada) Ltd., announces that the merger of Laucks, Ltd., a wholly owned subsidiary, into Monsanto (Canada) Ltd., was completed December 31.

The process of assimilation of Laucks, Ltd., adhesive manufacturers with headquarters at Granville Island, Vancouver, B. C., into Monsanto (Canada) Ltd., has been under way for over a year. Early in 1946 Monsanto (Canada) Ltd. acquired the capital stock of Laucks, Ltd., operating the company as a wholly owned subsidiary.

Officers of Monsanto (Canada) Ltd. include Leo Ryan, vice president; J. P. Shea, treasurer; H. E. Potter, secretary; and K. B. Owens, assistant secretary. Coincidental with completion of the merger, Arnold H. Smith, former acting managing director of Monsanto (Australia) Pty. Ltd., will assume his duties as vice president and member of the board of directors of Monsanto (Canada) Ltd.

Operations in Vancouver will be in charge of Branch Manager J. G. MacDermot.

Davey Compressor Names Myers

Appointment of C. W. Myers as divisional field engineer in charge of sales and service in Texas, Oklahoma, Arkansas, Louisiana, and western Tennessee, is announced by Davey Compressor Co., Kent, Ohio. Myers was formerly a member of the Davey headquarters sales staff and is a graduate of the company's service training school. Prior to joining Davey, he was affiliated with the Ford Motor Co. in Memphis. During the war, he served in the Pacific area as an Army Air Corps captain. Myers will maintain his territorial headquarters in Dallas.

Crittenden Named Special Projects Manager

William W. Crittenden has been named manager of the special-projects department of Westinghouse Electric International Co. Crittenden succeeds J. R. Bejarano, who has resigned to join a Brazilian company.

Three Appointments in Vapor Recovery

L. S. CURFEW

Vapor Recovery Systems Co. announces the appointment of L. S. Curfew as executive vice president; Joseph F. Lee as general manager; and George F. Denny as chief engineer.

Curfew has been with Vapor Recovery Systems Co. since its inception in 1928 and has progressively advanced through the positions of field superintendent, shop superintendent, plant manager, and general manager.

J. F. LEE

G. F. DENNY

Lee, former chief engineer, served as chief machinery engineer with the California Shipbuilding Corp. during the war and prior to that was with the design section, Bureau of Engineering, U.S. Navy, for 12 years.

George F. Denny, who replaces Lee as chief engineer, was a former development engineer with Vapor Recovery Systems Co. He too served in an engineering capacity with California Shipbuilding Corp. during the war and before that, spent 13 years with the refining department of the Texas Co.

New Officers in D.E.M.A.

In the recent Diesel Engine Manufacturers Association's election of officers held in Chicago, Gordon Lefebvre, president of Cooper-Bessemer Corp., was made president. Otto H. Fischer, president of Union Diesel Engine Co., and L. W. Metzger, vice president of Baldwin Locomotive Works, were elected vice presidents.

Robert H. Morse, Jr., vice president and general sales manager of Fairbanks, Morse & Co., was reelected treasurer of the association, while Harvey T. Hill was reappointed executive director.

Elected to serve 2 years on the board of directors were George W. Codrington, vice president of General Motors Corp. and general manager of Cleveland Diesel Engine Division; A. W. McKinney, vice president of National Supply Co.; Morse, Metzger, and Schwanhausser. The following were elected to serve 1 year on the board: C. S. Herbert, executive vice president, Enterprise Engine & Foundry Co.; W. E. Corrigan, vice president, American Locomotive Co.; Robert E. Friend, president of Nordberg Manufacturing Co.; Lefebvre, and Fischer.

The annual meeting, together with the D.E.M.A. engineers' session held December 9 and 10, comprised the most important and successful gathering the association has ever held. Topics discussed by the engineers included bearings, dual-fuel engines, and crankcase explosions. Full attendance at the meeting May 19-21 in St. Louis of the Oil and Gas Power Division, American Society of Mechanical Engineers, was urged by T. M. Robie, manager of the diesel sales division for Fairbanks, Morse & Co. Robie has charge of setting up the program.

Foxboro Occupies New Canadian Plant

With a house-warming reception attended by representatives of Canadian industries, civic and governmental bodies, and the press, Foxboro Co., Ltd., recently moved into its new building in the Ville LaSalle section of Montreal. Of brick and steel construction, with generous window area and sawtooth skylights, the plant represents the most modern trends in industrial building design. It is the largest plant in Canada devoted to the manufacture and sale of industrial instruments.

Foxboro Co., Ltd. affiliated with Foxboro Co. of Foxboro, Mass., was established in March 1933. The Canadian concern manufactures virtually the entire line of Foxboro instruments of measurement and control. John H. Bolton, manager, is in charge.

Johnston Visits Mid-Continent

Tommy Johnston, general manager of M. O. Johnston Oil Field Service Corp., Los Angeles, recently made a 6-week field inspection and sales trip via the company's airplane to Oklahoma, Texas, West Texas, and New Mexico. Considerable time was spent in the Permian basin and a new service branch was established at Cisco, Tex., to keep pace with the increased demand for Johnston formation testing and "Shoot-N-Test" gun-perforating equipment.

Kerotest Appoints Adams

E. T. "Kink" Adams has been appointed director of purchases of Kerotest Manufacturing Co. Adams has been foreign representative for Kerotest and for 12 years had been purchasing agent of Sinclair Oil Co. in Mexico. Prior to that time, Adams had been in the material department of Standard Oil Co. of Venezuela.

Bethlehem Supply Announces Promotions

Bethlehem Supply Co., Tulsa, announces the promotions of several of its personnel to field representatives.

T. W. Teague, formerly at the Winnsboro, Tex., store, is promoted to field representative at the Shreveport store.

N. E. Formby, formerly at the Kilgore, Tex., store, is promoted to field representative at the Winnsboro, Tex., store. N. E. Formby has had 3 years experience in the oil-field-supply business prior to his affiliation with Bethlehem in July 1945.

B. K. Smith, formerly special representative in the used-material department at Kilgore, has been transferred to the Corpus Christi district office and store and promoted to field representative for general equipment sales. Smith has had more than 10 years experience in the oil industry, being employed by Stanolind Oil & Gas Co. before coming to Bethlehem in March 1946.

E. M. Slette, at the New Iberia, La., district office and store, H. L. Daniels at the Lake Charles, La., store and L. E. Garner, Jr., at the Hobbs, N. M., store, have recently been promoted to field representatives and will operate from their present respective stores.

Hobson Plastics Sales Manager

Edwin L. Hobson has been appointed sales manager of Thermoplastic molding materials, Monsanto Chemical Co.'s Plastics Division. Hobson, now assistant branch manager for Monsanto's New York plastics office, will replace Arnold C. Martinelli, who resigned to become general manager of Rogers Plastics, Inc., North Wilbraham, Mass. The changes become effective January 1.

Hobson will be replaced in the New York office by James P. Skehan, now sales manager for sheet plastics. The sheet department will be combined with the packaging materials department under the direction of Richard C. Evans. Assisting Evans as assistant sales managers will be James Brunner, in charge of packaging materials sales, and Oscar E. Hollemans, in charge of sheet sales.

U. S. Steel Appoints Two

Two executive appointments are announced by United States Steel Corp. of Delaware. W. W. Reed, vice president-engineering for Carnegie-Illinois Steel Corp., has been appointed chief engineer of United States Steel Corp. of Delaware effective January 1. Richard F. Sentner has been appointed assistant vice president-sales, United States Steel Corp. of Delaware, effective January 1.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 10 cents a word. Minimum charge, $2.00 per insertion.
Centered Line, any ad, 75 cents.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

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$10.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
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THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

5000' good 20 lb. lap weld casing available for interest in drilling wells. Box 2007, Tulsa, Oklahoma.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

FOR SALE
STEEL STORAGE TANK

5—74,000 Barrel, 114' x 40'
1—8,500 Barrel
5—55,000 Barrel, 117' x 28' 1"

Available at Once!

IRON & STEEL PRODUCTS, Inc.
42 years' experience
19412 S. Brainard Ave., Chicago 43, Ill.
"ANYTHING containing IRON or STEEL"

WE BUY and SELL
Steel Pipe and Tubing
Pipe Fittings—Well Casing
Culverts and Valves
SONKEN-GALAMBA CORP.
2nd & Riverview, Kansas City 18, Kans.

EQUIPMENT FOR SALE

SULLIVAN "200" Rig. Mounted 1942 GMC Tandem. Thoroughly overhauled. 1200' 2⅞" Drill pipe. Complete with necessary tools. Can furnish pipe truck and water truck if desired. Lee Capshaw, 102 W. Boeing, Okla. City. Ph. 3-1292.

FOR SALE: One 500 barrel, bolted steel tank located near McLouth, Kansas. Write Box 285 or telephone 355, Iola, Kansas.

WELL drilling equipment for deep and shallow wells. Spudders, beams, light rotaries, core drills. Cable tools, casing, Leschen lines. Pressey & Son, Pueblo, Colorado.

FOR SALE: One 7¾ x 18 Model 15,000 Whelan-Lucey Power Slush Pump as good as new. Melton Supply Co., Box 1360, Seminole, Okla.

NEW CENTRIFUGAL PUMPS
BOXED FOR EXPORT
IMMEDIATE SHIPMENT

75—NEW Byron Jackson, 3" 2-Stage "PUP" Pickup Centrifugal Pumps, direct connected to C-36 Chrysler Engines, complete with Spare Parts, Tools, and etc.

PRICE COMPLETE F.O.B. TULSA, OKLAHOMA ..... $875.00 ea.

Also stock of Economy 125 GPM @ 300' Head, Gorman Rupp 200 GPM @ 350' Head, Hale Fire Pumps 500 GPM @ 150# 346' Head, Aurora 480 GPM @ 300' Head, Novo 10,000 GPH, Lombard 1000 GPM @ 281' Head—All Pumps with Engines, Spare Parts, Tools, Etc.

WRITE FOR LIST AND PRICES

H. A. McCARTHY
310 Thompson Bldg. Tulsa, Oklahoma
Phone 5-3295

FOR SALE

9—2,000 bbl. new, high type.
1—5,000 bbl. new.
6—10,000 bbl. new.
15—500 bbl. used, high type.
12—500 bbl. used, low type.
10—1,000 bbl. used, high type.
15—1,000 bbl. used, low type.
8—1,500 bbl. used.
4—2,000 bbl. used.
6—3,000 bbl. used.

All the above are bolted type steel tanks.

6—Used horizontal riveted and welded steel tanks, 5/16" thickness, 10' 6" in dia. x 30' long.

1—Used, heavy horizontal riveted and welded steel tank, 10'6" in diameter by 30' long, bulged heads, approximately 1" thickness throughout.

A large quantity of new, and guaranteed reconditioned steel tubing from ¾" to 6¼" OD. All is suitable for high pressure oil, gas, and gasoline lines. Every length of our used tubing will be tested for 600 lbs. hydrostatic pressure. Immediate shipment.

A. Greenspon Pipe Co., Inc.
3615 Olive Street, St. Louis 8, Missouri
FRanklin 1606

EQUIPMENT FOR SALE

FOR SALE: One used 36-L Bucyrus Erie Spudder, semi-trailer mounted. GF 638 Buda Motor. Machine and motor in good condition. May be seen in operation near Grand Rapids, Michigan. Fisher-McCall Oil & Gas, Inc., Box 66, Grand Rapids, Michigan. Telephone 6-1015.

FOR SALE—Large quantities oil well and water well casing; also line pipe, all sizes up to twenty inch. New Mexico Steel Products Company. Phone 7881. P. O. Box 2135, Wichita Falls, Texas.

GASOLINE ENGINES FOR SALE—Two Franklin Valveless Gas Engines, size 12-16, (40 hp.), type O.G., both ready to operate, one complete with clutch. One Reid Gas Engine, 25 hp., complete with clutch, ready to operate. All three engines in perfect condition. SAM R. DRITCH COMPANY, 313 South Main Street, Tonkawa, Oklahoma.

FOR SALE: Two Model JL-1335 Buda gas-butane engines, completely overhauled and guaranteed. One equipped with gasoline engine starting unit. Call or write, if interested in these engines at a bargain, to Empire Oil Field Machinery Company, Box 4026 or Phone LD 18, Odessa, Texas.

NEW A.P.I. BOLTED TANKS
60—1000 BBL., 415—100 BBL.
IN STOCK N. Y., NEW ORLEANS, LOS ANGELES

DARIEN CORP.
60 E. 42nd St., NEW YORK, N. Y.

NOW BEING DISMANTLED
ALKYLATE FACILITIES
ENID, OKLAHOMA

Towers — Pressure Vessels — Pumps—Instruments and Meters — Heaters — Condensers and Exchangers—Pipe and Tubing—Valves and Fittings.

Complete Inventory Available
Wire—Phone—Write

PETROLEUM EQUIPMENT, INC.
P. O. Box 887 Thrasher Bldg.
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FOR SALE
2 COMPLETE RADAR UNITS
NAVY TYPE SF-1

New and Unused
Still in original packing cases

ELLIOTT A. JOHNSON
P. O. Box 2175 Houston, Texas

1000 KVA
TRANSFORMERS

3—Westinghouse, 11500/2300/3985, single phase, Type SL Hypersil, Oil Insulated, Self-cooled. Installed new 1945, used for testing only. Location: Charlestown, Ind. Write for detailed inventory.

Horwitz Pipe & Steel Co.
Ph. 2-9128 Tulsa, Okla.

Polish Oil Industry

(Continued from page 27)

In Table 3 a more detailed picture is given of Polish production in 1946. Again, the figures refer only to those oil and gas fields which now belong to Poland. The final figures for 1947 are not yet to hand but the estimated output is also shown in Table 3.

Poland's resources of natural gas have recently been considerably increased following the finding of a new and prolific gas field near Cieszyn (on the Czechoslovak border). The lower gas-production figure for 1947, as compared with 1946 in Table 3, despite greater resources is explained by the introduction of strict saving measures in the employment of gas as a fuel in the oil industry. Only enough gas is being released to satisfy the most immediate industrial requirements, the bulk of the gas being conserved in the ground for later use.

A new pipe line has been built, connecting the gas field of Debowiec with the industrial areas of Oswiecim and Cieszyn as well as with the city of Cracow. The total length of natural-gas pipe lines in Poland now amounts to 886 km. (553 miles). The production of gasoline from natural gas (mostly pentane and hexane) and of liquefied natural gas (propane and butanes) is also growing (see Tables 3 and 4), due to the erection of new natural-gasoline plants.

Polish production plans for 1948 envisage investments of 1.5 milliards zloty plus $2,150,000 in respect of the oil industry and foresee production results as shown in Table 4.

Drilling Activities

Apart from the old regions of Krosno, Jaslo, and Sanok, where oil has been produced for a very long time, numerous exploratory drillings have been undertaken since the end of war. This was done in altogether new areas which have never been exploited before, e.g., near Bochnia (not far from Cracow), near Mielec (south of the upper reaches of the Vistula) and near Inowroclaw (west of the lower reaches of the Vistula). The recent discovery of a rich gas field in the western Carpathians (Debowiec), already referred to above, has resulted in further drillings being made in the search of gas. During one of those drillings a violent eruption of salt water, sand, and gas occurred at a depth of 4,300 ft. and there was considerable difficulty in getting it under control. This phenomenon occurred in the summer of 1947, near the town of Mielec. An interesting attempt was made in 1946 to exploit, by pit mining, the oil-bearing strata of Stara Wies, which are known as producing a type of crude oil which is nearly white in color. This operation, however, had to be abandoned in June 1947, owing to very dangerous working conditions and high costs.

There has been a marked decline of drilling activities in the Polish oil industry from 1938 onwards and the lowest point was reached in 1945. From 1945 on, however, a steady intensification is to be recorded and it is estimated that 150,000-170,000 ft. will have been drilled in 1947. The total numbers of Poland's oil and gas-producing wells are today 2,400 and 50, respectively.

Production of Synthetic Gasoline

During their occupation of Poland, the Germans built there three large plants for the synthetic production of gasoline and other products from coal. They are situated near the notorious German annihilation camp of Oswiecim (Auschwitz), at Blachownia (Blechhammer), and at Police (former Politz near Stettin). In 1945 the Russians dismantled these plants by way of reparations, but on the strength of a Russo-Polish agreement a complete Fisher-Tropsch synthetic-gasoline plant was later transferred from the synthetic works at Schwarzheide, near Dresden, to Oswiecim. This plant will be capable of producing about 20,000 metric tons (roughly 180,000 bbl.) of synthetic gasoline from coal which comes from the nearby coal mines in Upper Silesia. The synthetic plant at Oswiecim is scheduled to start production in 1948 and it is expected that this will be the beginning of synthetic-gasoline production on a larger scale. Poland has all the requisite conditions for such a development owing to her rich resources of coal and natural gas.

From the administrative point of view, synthetic-gasoline production has recently been transferred from the above-mentioned central board to the state chemical board.

Refining Activities

Prewar Poland possessed an extensive refining industry, with three large and modern refineries in Drohobycz playing a major part. Since Drohobycz lies in the area which was ceded to the Soviet Union by virtue of the Yalta agreement, there remain on Polish territory five medium-sized refineries and one of a small size. Three of these refineries, viz., Glinik Marjampolski, Jedlicze, and Jaslo, are situated in the Carpathian oil region, whereas the refineries of Trzebinia and Czechowice as well as the small plant in Katowice geographically belong to the Cracow-Upper Silesia industrial center.

All these refineries have suffered extensive war damage and a great deal of the equipment was carried off by the retreating Germans. The administration of the Polish oil industry, however, succeeded in bringing the refineries to full operation in 1946 and 1947. Jointly, they are now capable of processing about

TABLE 2—PRODUCTION OF CRUDE OIL IN WESTERN POLISH OIL FIELDS
(1938—1946)

Year—	1938	1939	1940	1941	1942	1943	1944	1945	1946
Production in 1,000 metric tons	160	160	148	150	141	142	110	104	117
Production in 1,000 bbl.	1,184	1,184	1,095	1,116	1,043	1,059	814	770	866
New exploitation in 1,000 metric tons	....	....	....	....	....	....	....	3.2	8.8
Number of producing wells	1,804	2,011	2,186	2,191	2,359	2,443	2,203	2,317	2,411

(The figures for new exploitation from 1938 to 1944 are not available.)

TABLE 3—PRODUCTION OF OIL, NATURAL GASOLINE, AND GAS IN 1946 AND 1947

	Production in 1946		Production in 1947	
	Metric tons	Bbl.	Metric tons	Bbl.
Crude oil	116,742	864,000	136,772	100,000
Gasoline from natural gas	3,157	28,500	5,770	52,000
Liquefied propane and butane	537	.....	780	.....
	Million cu. meters	Million cu. ft.	Million cu. meters	Million cu. ft.
Natural gas	150.6	5,320	130	460

TABLE 4—PLANNED OIL AND GAS PRODUCTION FOR 1948

	Metric tons	Bbl.
Production of oil from areas already exploited	135,000	980,000
Planned production from newly exploited areas	20,000	148,000
Production of casing-head gasoline	8,500	76,500
Production of liquefied propane and butane	10,000	.....
	Million cu. meters	Million cu. ft.
Production of natural gas	150	530

TABLE 5—PRODUCTION OF GASOLINE FROM NATURAL GAS AND CRUDE-OIL STABILIZATION

	July 1947		First of January until end of July 1947	
Gas produced—	Metric tons	Bbl.	Metric tons	Bbl.
From natural gas	405	3,650	2,494	22,500
From crude-oil stabilization	94	920	611	5,500
Total	499	4,497	3,105	28,000
	Cu. meters	Cu. ft.	Cu. meters	Cu. ft.
Amount of gas processed	6,821,424	240,000,000	54,512,926	1,923,926

1,400,000 bbl. of crude oil per annum. All types of final products are obtained, in spite of the fact that most of the distillation, refining, and dewaxing plants are out of date.

The central board for the industry of liquid fuels has worked out an extensive plan, with a view to meet the rising requirements of oil products in the country. It is envisaged that refineries which are out of date will be abandoned. The refinery of Trzebinia is to be equipped with modern units and enabled to treat 1,680,000 bbl. of crude per annum. As soon as sufficient quantities of crude can be supplied, an entirely new refinery is to be built, fitted out to treat 3,500,000 bbl. per annum. The location of this new refinery is not yet determined and its erection, as well as the extension of the Trzebinia refinery, is made conditional upon the results of exploration work for new oil fields in Poland. Should the next 2 years show little progress in the search for more crude oil, an alternative program for a speedy erection of plants for the production of synthetic motor fuels from coal and natural gas will be put into operation.

The Central Board also administers two small lime base grease plants with a producing capacity of about 35,000 bbl. per annum.

The following figures give a picture of Polish refining activities in the first seven months of 1947:

TABLE 6—REFINING ACTIVITIES IN 1947

Items processed—	July 1947 Metric tons	Jan. 1 to end of July 1947 Metric tons
Polish crude oil	12,236	73,898
Foreign crude oil	4,039	24,867
Total crude oil	16,275	98,765
Gasoline	4,485	30,000
Kerosine	3,246	17,559
Gas oil	3,277	18,669
Lubricating oils	2,995	17,250
Paraffin wax	0.195	1.765
Petroleum jelly	0.046	0.335
Bitumen	0.726	4.856
Coke	0.188	0.890
Other products	0.207	1.270
Total	15,365	92,614

Production of Gasoline from Natural Gas

The central board is also in charge of 11 plants for the extraction of gasoline from wet natural gas, by absorption on activated charcoal. The gasoline is partly stabilized and the liquefied propane-butane mixture obtained is stored in steel bottles. Recently stabilization of gases escaping from crude oil wells has been introduced, thus yielding additional gasoline.

Kewanee Buys Farris' Interests

Kewanee Oil Co. has purchased from R. B. Farris, independent operator of Fort Worth, his interest in 28 producing wells on two leases in the Cache Creek field of Cotton County for a reported $800,000.

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CALENDAR

January 1948

Society of Automotive Engineers annual meeting, Book-Cadillac Hotel, Detroit, January 12-16.

American Association of Petroleum Geologists, regional meeting, Jefferson Hotel, St. Louis, January 14-15.

Independent Petroleum Association of America, winter meeting, Midland, Tex., January 19-20.

February

American Institute of Mining and Metallurgical Engineers, annual meeting, Pennsylvania Hotel, New York, February 15-19.

Kansas Oil Mens' Association, annual meeting, Wichita, February 16-17.

March

Texas Independent Producers & Royalty Owners Association, annual meeting, Corpus Christi, March 12-14.

Natural Gasoline Association of America, annual convention, Texas Hotel, Fort Worth, March 24-26.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, March 24-26.

Southern Gas Association, annual meeting, Galveston, Tex., March 24-26.

April

Western Petroleum Refiners Association, annual meeting, Galvez and Buccaneer hotels, Galveston, April 5-7.

Oil-Heat Institute of America, convention and exposition, Coliseum, Chicago, April 5-8.

National Association of Corrosion Engineers, fourth annual conference and exhibition, Jefferson Hotel, St. Louis, Mo., April 5-8.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla., April 13-15.

American Petroleum Institute, Division of Production, southwestern district meeting, Plaza Hotel, San Antonio, April 14-16.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, April 26-29, Shirley-Savoy Hotel, Denver.

American Society of Lubricating Engineers, annual convention, Statler Hotel, Buffalo, N. Y., April 19-21.

National Petroleum Association, Hotel Cleveland, Ohio, April 21-23.

May

Natural Gas Department, American Gas Association, annual spring meeting, Rice Hotel, Houston, May 4-5.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 6-7.

International Petroleum Exposition, Tulsa, May 15-22.

Gas Technology Short Course, sponsored by the Southern Gas Association, Texas A. & I. College, Kingsville, May 31.

June

American Society for Testing Materials, fifty-first annual meeting, Book-Cadillac Hotel, Detroit, Mich., June 21-25.

American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 30, July 1-2.

Canadian Gas Association, annual convention, Jasper Park Lodge, Jasper, Alta., June 30-July 3.

September

Pacific Coast Gas Association, annual convention, Hotel Casa del Rey, Santa Cruz, Calif., September 14-16.

NOMADS

Houston Nomads, second Monday of each month, The Houston Club, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.